THE ARCHITECT & BUILDING NEWS

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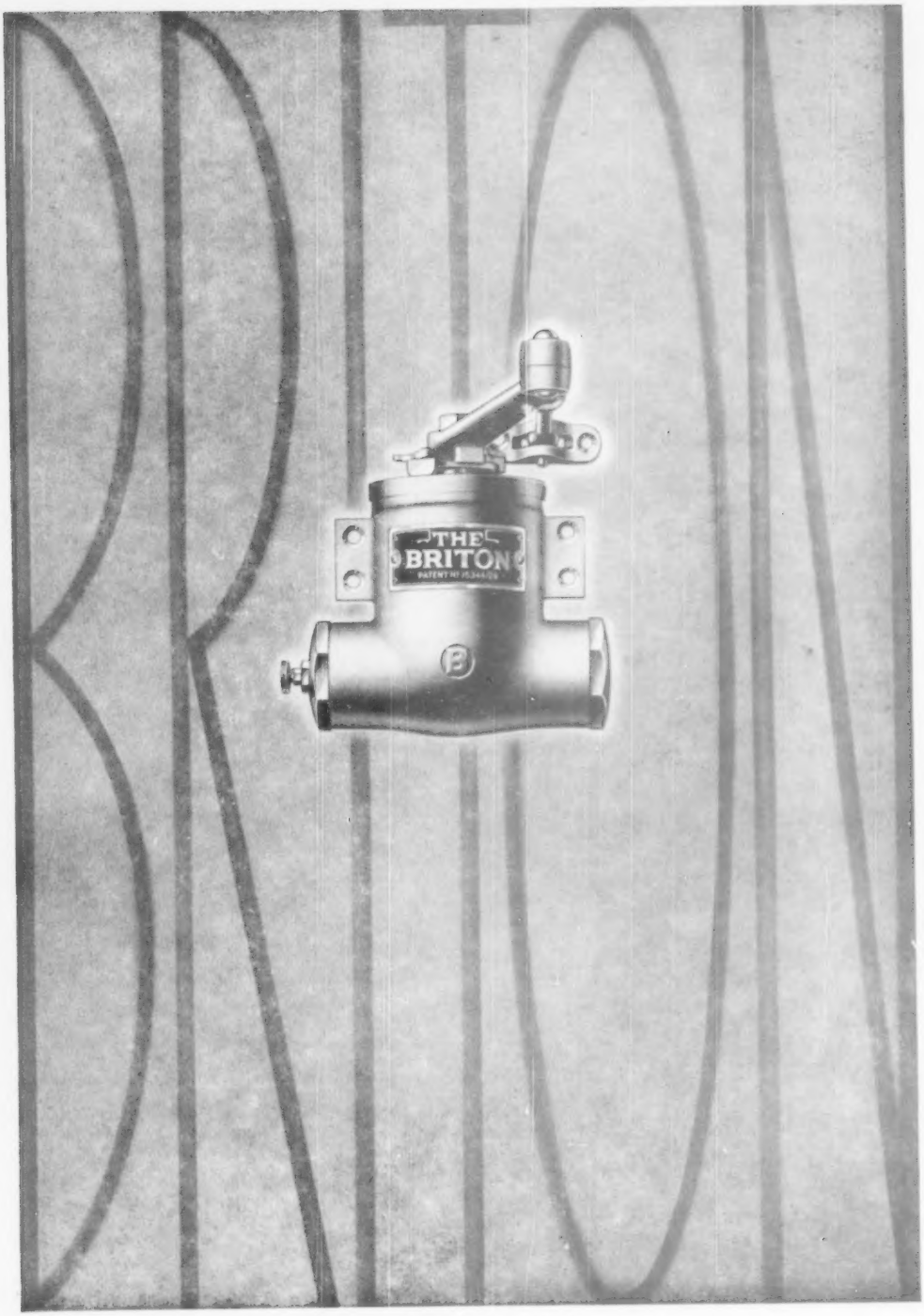
- THE MEANING OF RESIDENTIAL DENSITY
- NEWS OF THE BUILDING INDUSTRY

SEPTEMBER 22, 1950 · VOL 198 · NO 4266 · ONE SHILLING WEEKLY



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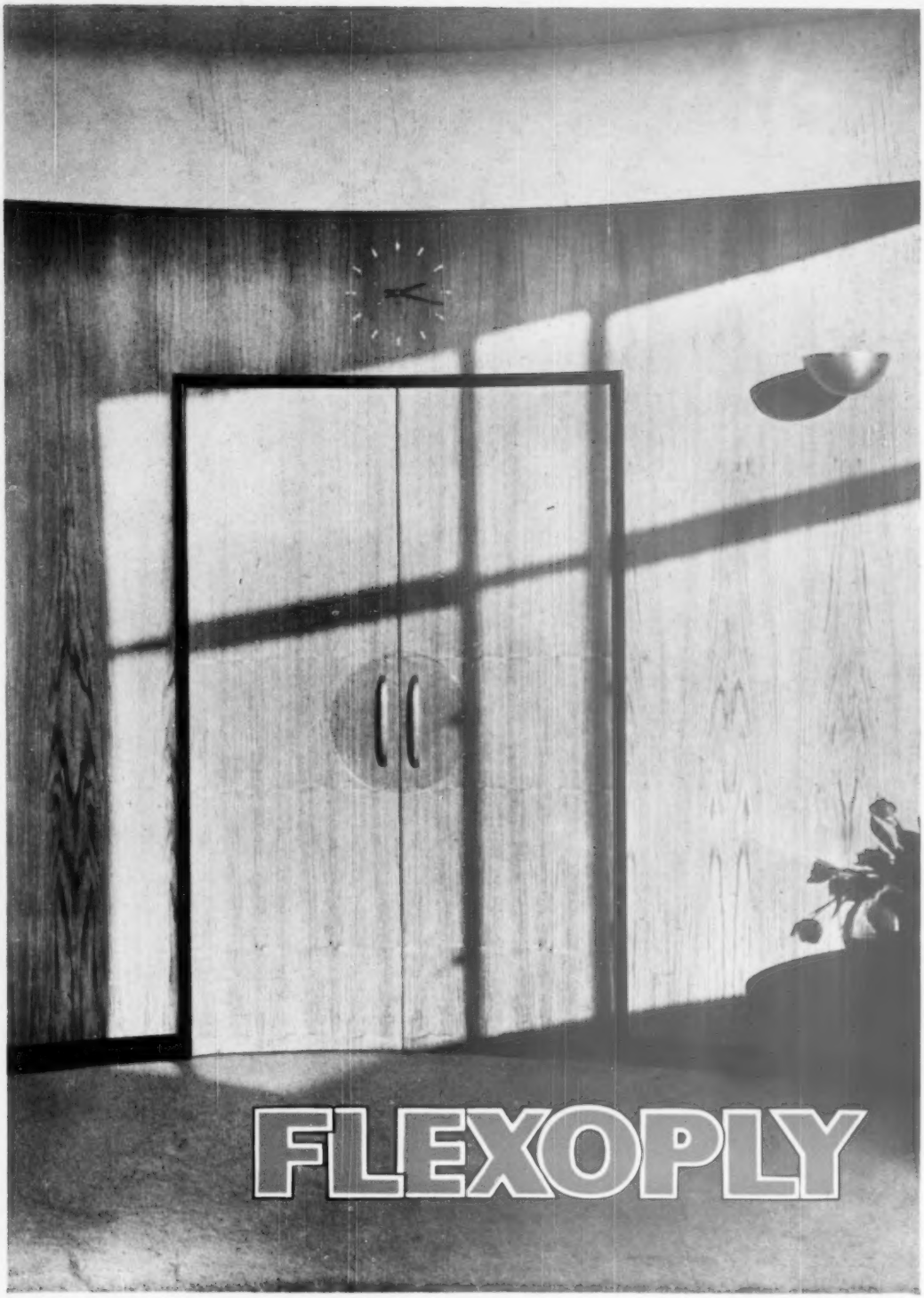
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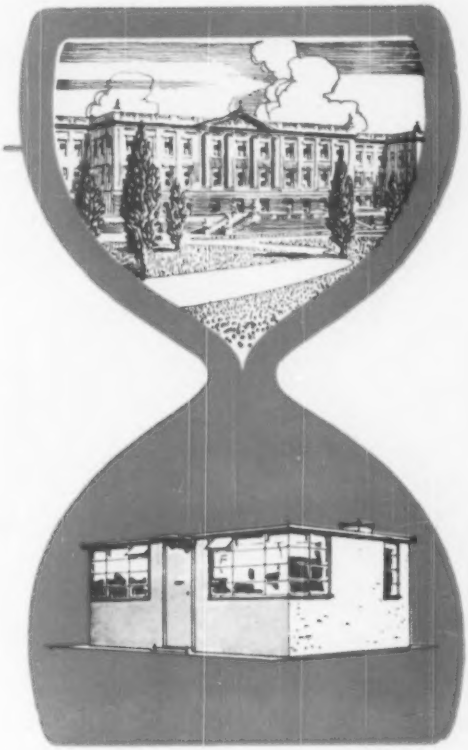

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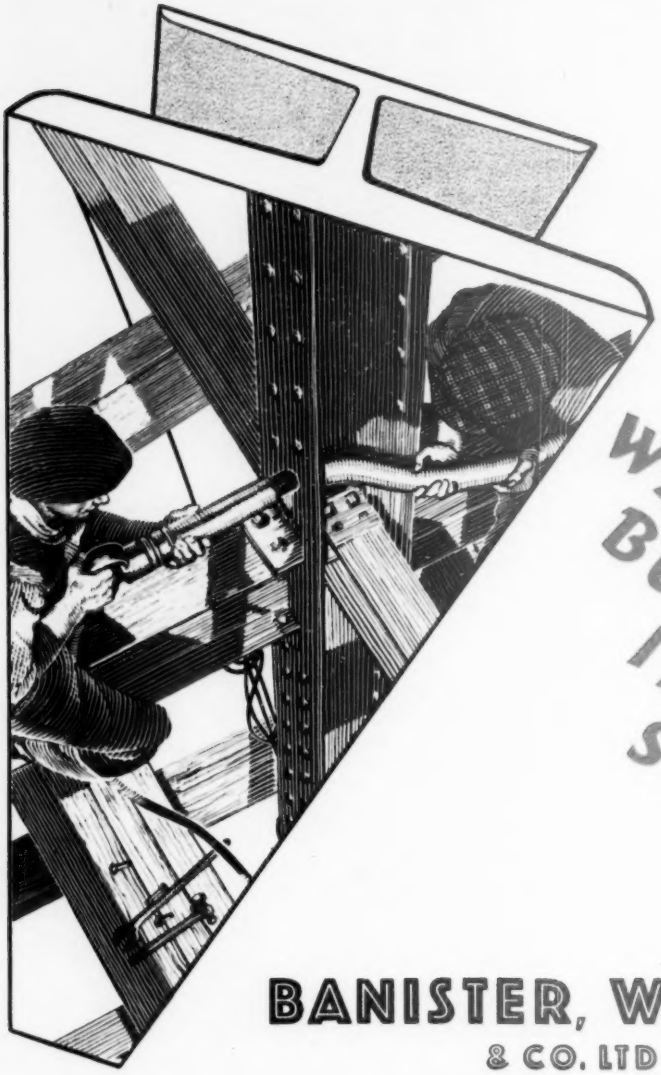

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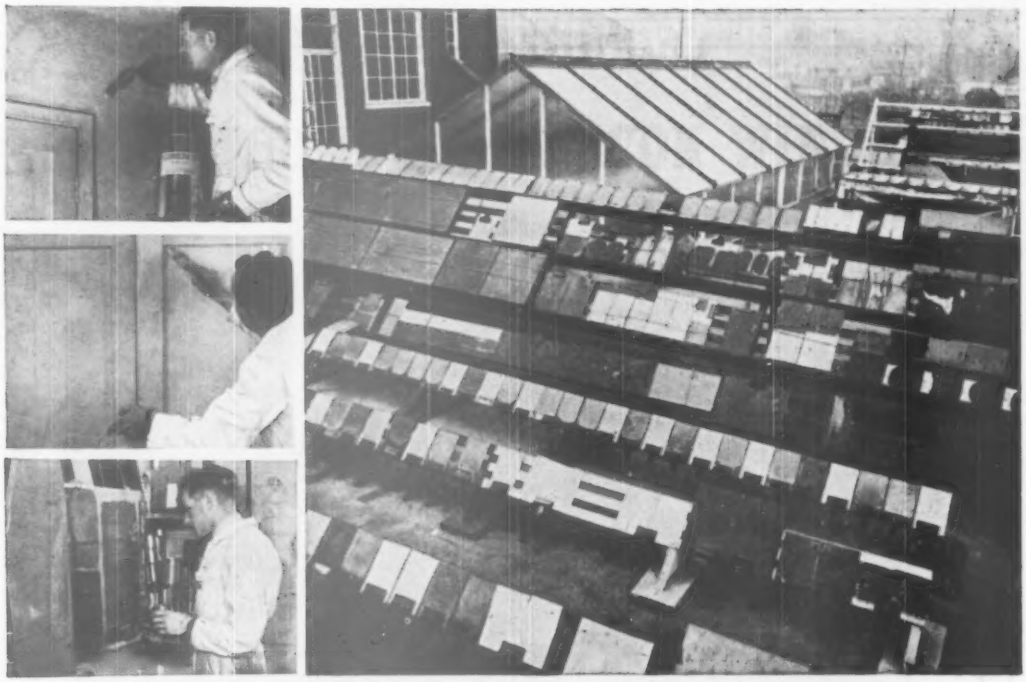

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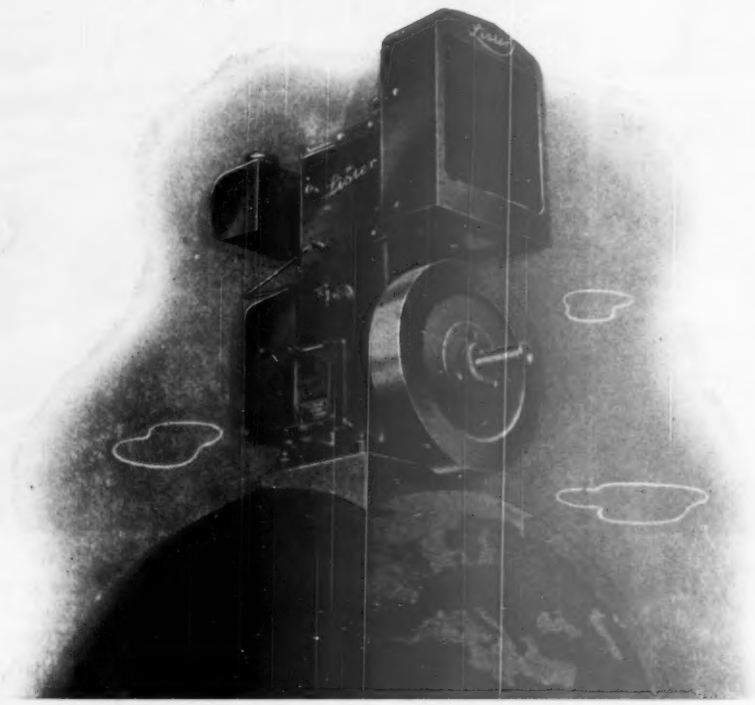

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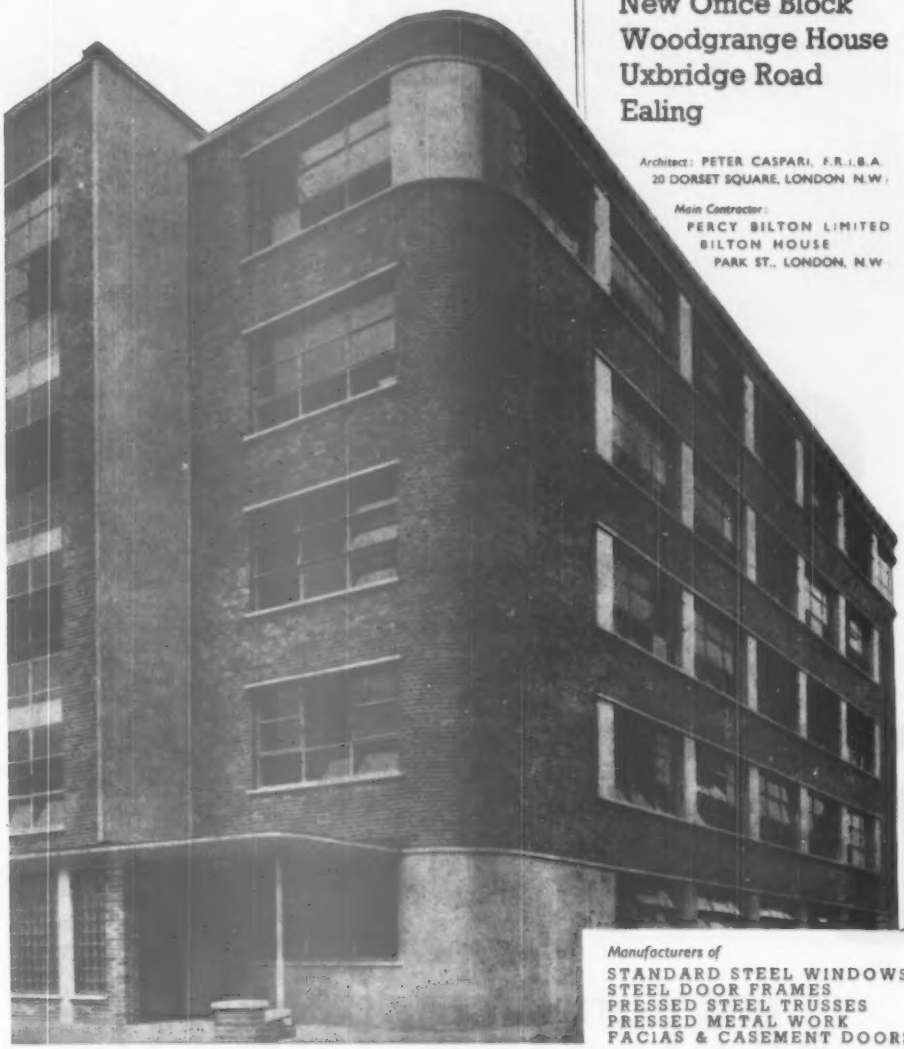

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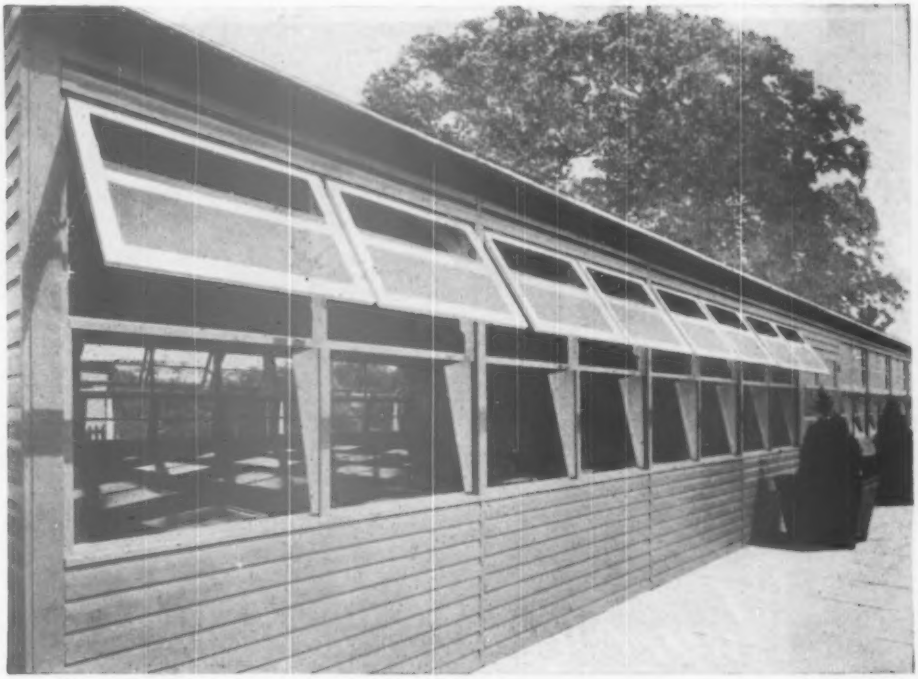

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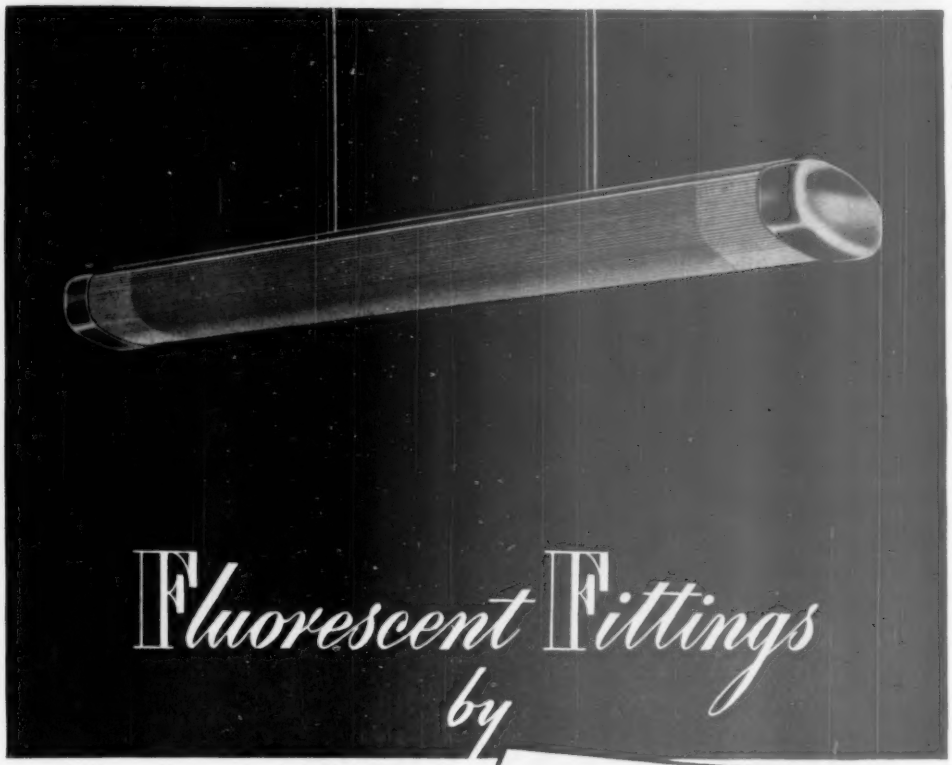

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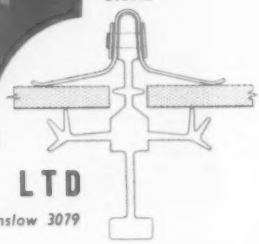

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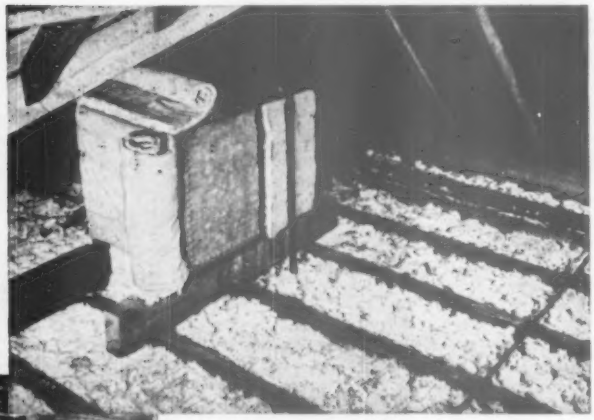

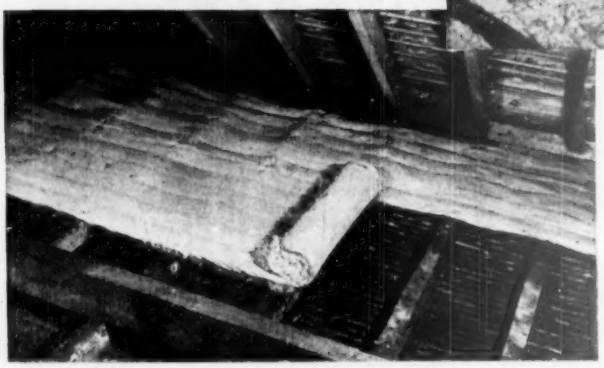

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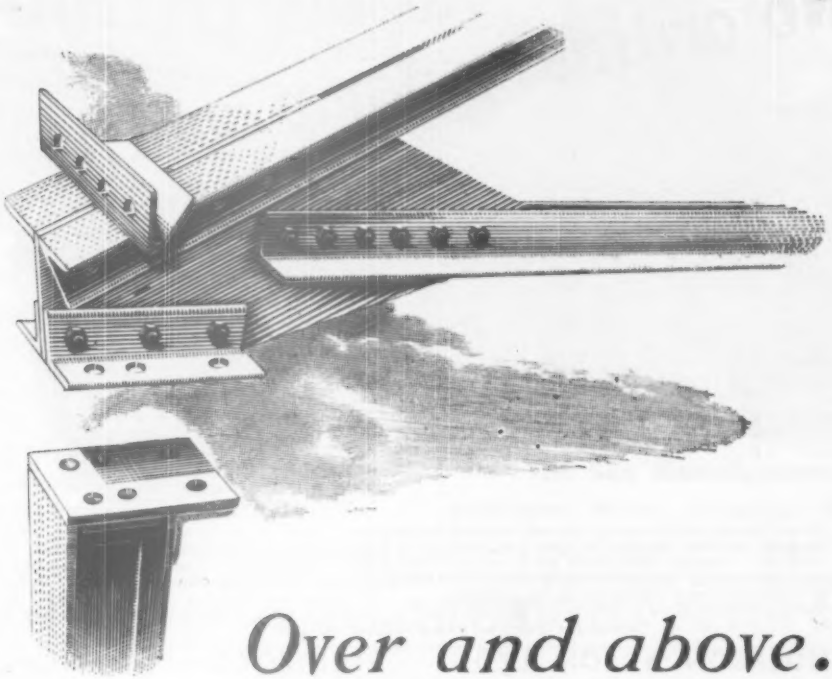

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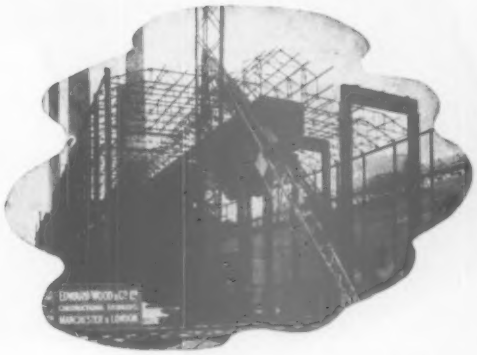

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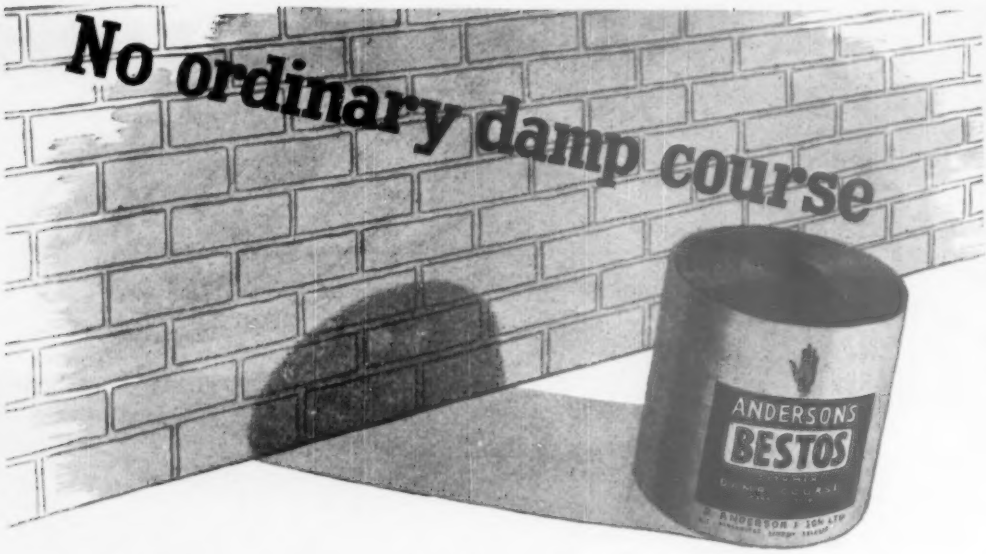

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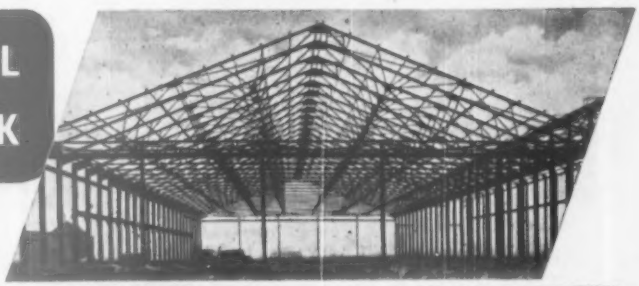

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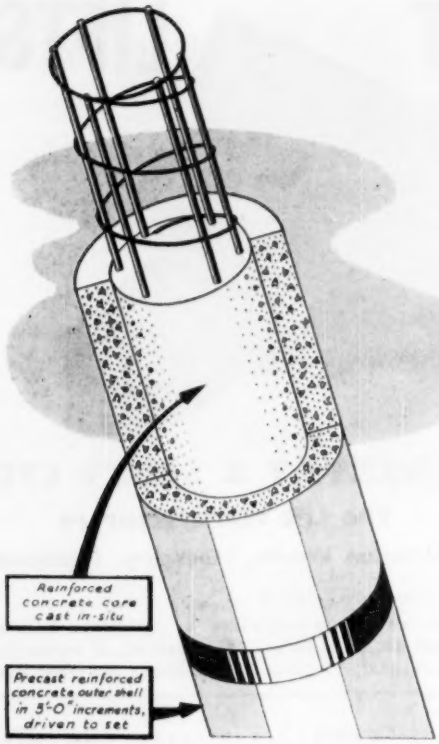

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THE ARCHITECT & BUILDING NEWS

September 22, 1950.

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DISCIPLINE IN CIVIC DESIGN

SOME of the most interesting and, perhaps, controversial, subjects discussed at the recent Town Planning Institute's Summer School were left to the final session when Sir Patrick Abercrombie let off some of his well-known and vigorous steam on the subject of the control of external architectural appearance. His quick-fire pungency and humorous attack is always worth listening to, and in this paper these concomitants were far from absent. We felt, however, that behind all the lightness of touch was a distinct, even strong and serious, feeling that all was not so well with visual appearances of our prospective planning under the 1947 Act.

Whatever may be said on this subject, the fact remains that the Act is still in the throes of settling down to the administrative routine of both local and central authority. We have no real experience of its effects, though certain "stronger-minded" planning authorities have gone ahead, for good or bad, willy-nilly, with or without the help of the complexities of the new legislation. As Sir Patrick observed, however, we are now one stage further on by the acknowledgment that control *is* a power under the Act, if only through the somewhat negative method of excluding from control the majority of farm buildings by virtue of a recent order by the Minister.

The real issue for architects is just what control, or, as Sir Patrick prefers it, discipline, means and how it is to be applied. His dictum that "argument for Discipline is, of course, a confession of failure to create a satisfactory environment instinctively" is only too true. But if architectural discipline can be a dead hand, "there is also the 'living fist!'" and elsewhere he asks, "Does dullness need discipline?" The type and amount of control can obviously range through the degrees of discipline that lie between "Totalitarian Control and Perfect Freedom."

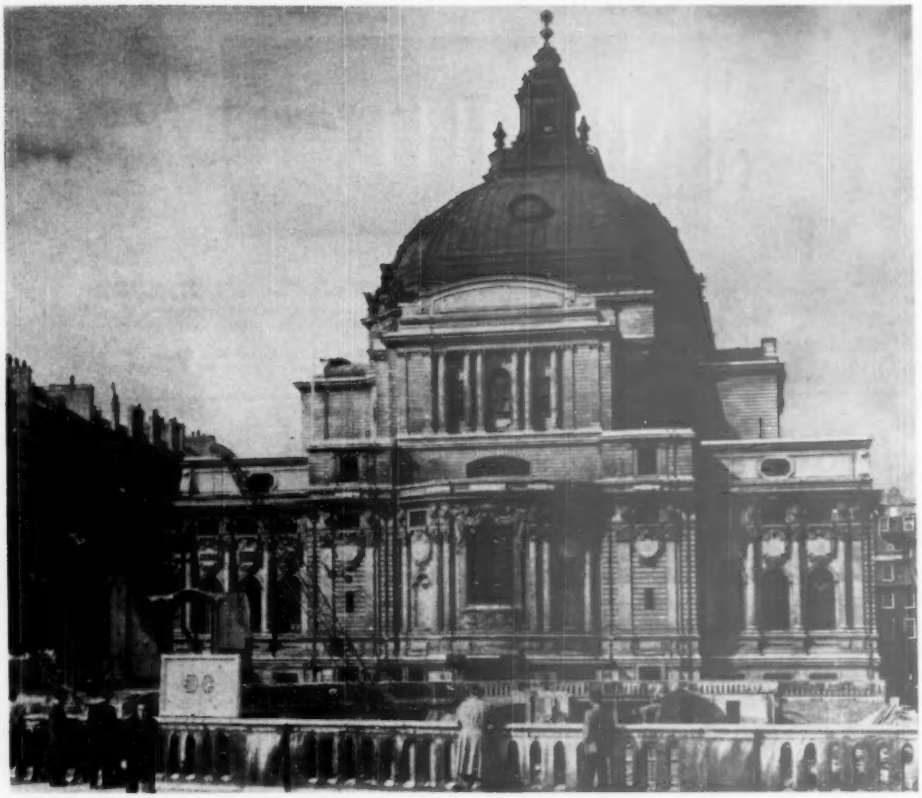
Sir Patrick also said and we agree, with applause, that "control should only be excusable by law if adequate artistic advice is given." The Ministry's Manual on External Appearances suggests that there is no substitute for the advice of competent architects; here, then, is the rub; in the words of the Professor—"the hardest task of all to decide (by whomsoever the decision is made) who is a competent architect."

The last thing that good designers can admit—in fact, of course, the 1947 Act will not let them do so—is any return to the full tenets of the school of *laissez-faire;* the old idea that good always will arise by individual efforts without social co-operations or regard for anything but the incentives of sheer competition—with "an invisible hand (according to Adam Smith)"—we quote the Professor again—"producing harmony or at any rate harmless chatter."

Whatever method of control is chosen, it must always be implied that there must be the maximum consultation between developer and adviser (designer) and that this should always occur at the early sketch-plan stage. Any later stage of consultations may cause irritations and appeals. Methods of mutual aid, tolerance and goodwill, whatever the financial grade or the political colour of either developer or adviser, are the best supports for wise legislation and adequate administration of those affairs, and visual appearance is one, that affect the community as a whole.

Sir Patrick, however, has exposed the horrid core of the situation without giving us—except by the many examples of his past life and work—a prescription of the remedial requirements. The diagnosis can be summed up by the one word "competent," and we must face up to it, if architecture is really to live again in the mid-twentieth century reconstructions and developments of our towns.

Are all the officials—whether architects, engineers or town planners—at present concerned with the



THE CENTRAL HALL, WESTMINSTER

During the interval between the demolition of the old Westminster Hospital and the erection of the new Colonial Office, this notable example of Edwardian Baroque may be seen as it deserves to be seen. The competition for the design of the Central Hall was won by Messrs. Lanchester and Rickards in 1908, and the building was completed in 1912.

administration of the 1947 Act *competent* to judge and advise all and sundry on the problems of "civic design" in its widest sense? A few—yes; the majority, alas! no. This is not to decry their usefulness in technical, legal and routine administration, in which most are efficient and many helpful, but it is necessary to realise that all cannot have the type of highly-trained architectural mind that can deal successfully with the three-dimensional urban problems, even within the outlines of a statutory development plan and much less can they cope when building actually starts.

Here is the crux of the whole matter of control: in education, experience and knowledge. These are to a very large extent now lacking in the architectural field of discipline and control, as required by the Town and Country Planning Act. As we have said somewhere before, the Act is far in advance of the capacity of the professions and the administrators to deal with to the fullest extent; it is almost a new phenomenon in the sphere of law—the latter is, for once, not out of date, but in front.

It becomes us, therefore, to be humble enough to admit that most advisers, if not all, will have to learn their jobs or by education and experience find out more about them. The former way, education, does not adequately exist at the moment; there are too few courses, extensions to the existing architectural curricula, on this subject of urbanity and "satisfactory environment"; the latter way, experience, is the hard road and so it is proving to many official and consultative advisers who, for want of any better way, are having to traverse it.

As Sir Patrick said, at the end of his paper, "I would appeal to the Architectural Profession to drop Allergy, Anarchism and Adam-Smith, and to revive the glorious position which they held in 1910, when they were real pioneers (in town planning) . . . and not to neglect the general contributions which Architects can make to the whole practice of Town and Country Planning."

EVENTS AND COMMENTS

LAST NEWS FROM WALES

THE last week of my camping marathon had its moments including continuous high wind, a great deal of rain, a guest night in the pre-war manner, and three days firing. Our military labours were rewarded by shooting down three successive targets for a total of eighteen rounds. Quite a performance even in these days of radar and electronic predictors. We might well have had a fourth had not the Instructor on a neighbouirng gun position telephoned and asked for mercy to enable his clients to have a go.

In celebration the troops chose to go to Aberystwyth the next afternoon where we all ate ices on the icy front followed by fish and chips for tea in one of the many shops devoted to this altogether admirable industry. As far as I could see everyone in Aberystwyth has fish and chips for tea every day. Later we assembled in a pleasant pub to tell each other what jolly fine fellows we were.

Aberystwyth on a cold windy day is not my idea of an afternoon's entertainment in spite of the What-the-butler-saw on the sawn off pier, the castle ruins and the Gothic baronial university college buildings on the front. Welsh Victorian architecture is on the whole remarkably bad, and the good Queen's Jubilee was directly responsible for some of the worst horrors. The number of really monstrous clock towers erected to celebrate the occasion is legion.

On a bookstall I found a Victorian novel entitled *Fashionable Life at Almack's* and bearing a fine dedication which begins "to that most distinguished and despotic conclave, composed of the Ladies Patronesses of the Balls at Almack's, the Rulers of Fashion, the Arbiters of taste, the Leaders of Ton and the Makers of Manners . . ."

Our military obligations completed we drove as far as Gloucester and on the way inspected the largest cider factory in the world at Hereford. The great oak vats with their horizontal white stripes would make a perfect subject for one of our leading architectural draughtsmen. After our tour we lunched at the Green Dragon, a large and comfortable hotel full of people doing the Wye valley. Everything seemed strangely civilised after the bare essentials of Wales.

Now I am safely within four walls again, the wind continues to blow, there are plums to be bottled, thousands of apples to be picked, and the Lord knows what is awaiting me at the office to-morrow.

STUDENTS ON THE JOB

I HAVE received an interesting letter and some photographs from a member of a group of fourth year architectural students who have been working on a building site at Crawley New Town. The job was a factory with a concrete barrel vault and included what is said to be the first post tensioned pre-stressed concrete road in the country. The contractors, Messrs. Holloway Bros., treated the students very well and gave them every possible help. They were put in any trade they wanted and were allowed to change round. The general foreman was particularly helpful and went out of his way to explain points of interest. I am very pleased to be able to report such excellent co-operation from the industry. Messrs. Holloway Bros. are setting an example which I hope will be followed by other firms. My correspondent does not give the School of Architecture at which he and his friends are studying, but he lives in Brighton.

STUDENTS ON THE SEA

FOUR Irish students of architecture, average age under 21, have reached Bermuda in a 36 ft cutter. They are on their way from Eire to America where they hope to study. They crossed the Atlantic in 76 days. I wonder whether they emulated Pugin by preparing working drawings at sea.

THE FESTIVAL

CONSIDERING what a keen supporter of the Festival I am it is remarkable that I have so far not visited the site. The *Evening Standard* recently accused Mr. Herbert Morrison of being 'almost the sole champion' of the Festival. This seems to me to be an unwarranted assumption. The *Evening Standard* further stated that Mr. Morrison was very keen to have a permanent pleasure garden in London on the lines of the Tivoli Gardens in Gothenburg. An excellent idea. Battersea Park should show whether we can do this sort of thing well.

I hear from an agent that it is intended to put the final coat of paint on the festival buildings this year. If this is true it will probably mean an extra coat in the spring and extra cost, or a shabby show on opening day. One can imagine the bill. "To painting the South Bank Exhibition One coat . . ."

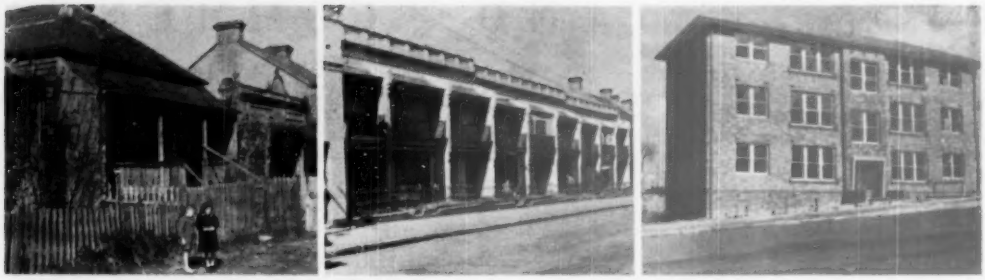
The Shot Tower is to be surmounted by a lighthouse unit capable of being seen forty-five miles away on a clear night (a pity they could not stretch it to 51). I seem to remember something about a "radar telescope", whatever that may be. Has the idea been dropped? What with the lights on the Victoria Embankment which I mentioned a week or so ago and the lighthouse, navigation on the Thames will be a hazardous enterprise next year particularly as a certain number of Sirens are bound to install themselves in the neighbourhood of Battersea Park.

THE TAILOR OF TASTE

THE M.o.T. & C.P. has dismissed the appeal of Messrs. Montagu Burton against the refusal of the Oxfordshire County Council to approve designs for the firm's proposed new shopfront in Henley-on-Thames (This page August 4.) The Minister states that he "cannot agree that a design of shopfront which has been adopted for commercial reasons because, above all, it is distinctive and unlike the general run of shopfronts, must necessarily be accepted in every town and on every site which the trader chooses to occupy." Well said the Minister! The course which the Tailor of Taste will now take remains to be seen. My advice is to re-design his standard shopfront so that this sort of argument does not arise again.

NATIONAL TRUST AND HOUSING

THE Dolgelley Rural Council wants to buy some National Trust land for housing. The Trust will not sell. The Council is annoyed and some of its members want to invoke compulsory powers. They do not consider that the National Trust should have preferential treatment. It appears that sanction would first have to be obtained from Parliament to compel the Trust to sell. I was under the impression that the whole idea of the National Trust was to preserve the countryside, but of course it all depends on what is meant by preservation. If we preserve the whole country where are we to build the houses? Each case should be treated on its merits or a wonderful state of "chassis" may result and in extreme in-



Australia has a housing shortage due to the large number of immigrants, and British-built prefabricated units are being imported. The three examples are all at Redfern, an industrial suburb of Sydney, and the one on the right is of a new block of flats erected by the Ministry of Housing.

stances the Trust might be made to sell its most famous beauty spots for development. I have not seen the piece of land at Dolgelley and so cannot attempt to say who is right. This question has, not so far as I know, arisen before. It should be treated with tact and commonsense. Two attributes which are too seldom used to solve town planning problems.

RENTS IN PIMLICO

IN an attempt to be fair to all, the Westminster City Council is proposing to relate rents to incomes in its new Pimlico flats. You may either pay a rent equal to one-sixth of your income or submit to a means test every six months. Some people are very angry but the Council says that only 23 out of over a hundred are dissatisfied. The idea is I suppose, in these ultra-democratic days, fair enough. By that I mean that it favours the lower income groups in that they get more for their money. I do not like it and am in favour of equal pay for women and equal rent for the same accommodation.

THE CRAFT OF DRY WALLING

There are no government training facilities for those who wish to take up the craft of dry stone walling. The government is however willing to try to "make suitable arrangements for anyone interested." The question arose in Yorkshire but it must apply equally well in any stone district. The miles of dry stone and slate walling in Wales, very often on the most inaccessible mountain sides, are a constant source of wonder to me. Built I suppose at the time of the enclosures they have received and seem only to need very little maintenance. Who did the work and what was then considered a reasonable day's work?

ABNER

NEWS OF THE WEEK

R.I.B.A. Reception

The Council of the Royal Institute of British Architects are holding an informal reception early in October for architects and students of architecture from the British Commonwealth and from the United States.

Although lists of names and addresses of such visitors have been obtained from Allied and Corresponding Societies and Schools of Architecture in those countries it is thought that there may yet be some visitors who, due to a change of address, will not receive an invitation. The Secretary R.I.B.A., 66 Portland Place, W.1., will therefore be very grateful to any reader who, knowing the address of any architectural visitor from the Commonwealth or United States will be kind enough to pass this information on to him.

A.B.T. Resolutions at Brighton Conference

At the 82nd Trades Union Congress held at Brighton from September 4 to 8, the following resolutions, moved by Mr. Kenneth Campbell A.R.I.B.A., on behalf of the Association of Building Technicians, were carried:—

Higher Education

This Congress, affirming its belief in the principle of equality of opportunity for higher education, and determined that no one shall be denied entry into our universities and technical schools because of financial difficulties, calls upon the Government to:—

(1) Prevent any increase in the fees of universities and technical schools.

(2) Prevent any diminishing in the number of state-aided students following the termination of the Further Education and Training Scheme for ex-Service men and women.

(3) Raise the level of all Local Educational Authority Scholarships to the level of the State-aided grants.

(4) Provide adequate maintenance grants to all students receiving scholarships.

British Standards

This Congress notes with concern the developing tendency on the part of the Government to cut down standards of space, equipment and planning in housing, schools and other social services. It deplores the reductions in standards already imposed on schools and threatened for housing. It demands that economies that are necessary shall not be made at the expense of standards so recently achieved by the working class. It believes that building costs should be reduced by restrictions of profits and a thorough reorganisation of the industry, including Government control of building materials, an enlarged programme of Government research directed towards more complete mechanisation of the industry and a greatly extended use of standardised structural systems and components.

Mr. Stokes on the Building Programme

Mr. R. R. Stokes, Minister of Works, told the annual conference of Amalgamated Society of Woodworkers at Blackpool on September 20, that he was glad to be able to contradict the President (Mr. S. D. McKelvey) who had said on the previous day that he expected a restriction in the building programme next year.

"I do not expect any such thing," said the Minister. "I anticipate an alteration—a switchover from one class of work to another—but as far as I can see and as far as I have heard from my colleagues, there would not appear to be any likelihood of a falling off—in fact the reverse.

"The programme ahead of us is so gigantic, I cannot see it being fulfilled in the foreseeable future."

On top of the huge programme of house building, reconstruction of cities and erection of factories and schools, they now had civil defence.

With regard to the housing programme, the Minister said that he wanted to see the target go up with the same cost and the same labour force. "We could cut the cost of houses by 15 per cent, so that for the same cost we could increase our 200,000 housing programme to 230,000 houses." He explained that the Government were keeping the closest watch on "patches of unemployment in the building industry." He had a monthly report from each region anticipating what was going to happen three months ahead, and should it appear likely that there would be unemployment in any particular area, they could immediately increase licensing in that area to take up the slack before there was in fact any slack.

The Government were doing everything possible to ensure that there would be no further shortages of materials.

Timber stocks to-day were many tens of thousands of standards higher than three months ago, although they had not yet reached the target. He was satisfied that they would not have the same "ridiculous position regarding cement" that they had in the Spring. He had told the cement industry that according to expert information there would be a ten year warm cycle (conducive to house building) so they should plan for enough cement during the next nine years to keep the industry going in the cold months. It was also essential that brick production should go up above the six thousand million target.

The Minister did not believe the overall amount of steel used in the building industry would be seriously affected. It would be at least equal to the quantity they had been consuming in the last few months.

The Preliminary Plan for Lancashire

The interim edition of the Preliminary Plan for Lancashire was issued by the County Council to all interested authorities in March, 1950. Its main purpose was to bring out the character and scale of the problems which the Development Plan must attempt to solve and to assist all the authorities to reach an early decision on the policies which would govern the form of the Development Plan to be submitted to the Minister of Town and Country Planning in July, 1951.

The interest created by the suggestion of three possible New Town sites in Lancashire has to some extent overshadowed the other major proposals of the Plan. These define the areas in which major urban development in the Administrative County should take place during the next twenty to thirty years, not only to meet the needs of the 105 county districts included in the Plan, but also 12 county boroughs who appear to have insufficient land for their future requirements. Clearly, if these development areas and the principles which have determined their boundaries could be agreed by all the authorities concerned, a major step towards the completion of the Development Plan would be achieved.

During the last five months there has been a ready response from the county districts to the plea for early decisions on the broad policy and principles of the Plan. Official comments have now been received from more than 80 county district councils from which it is possible to detect certain broad trends of opinion.

Already it is clear that the Preliminary Plan is being favourably received and indeed welcomed by the majority of the county district councils. A total of 72 authorities have either no observations to make, approve the proposals in principle or have suggested minor amendments in detail. Only ten authorities have put forward major objections or amendments. With these favourable results it should not be difficult for the County Council to define a policy which will have the full approval of the vast majority of the county district councils.

The Plan estimated that there would be an overspill of 639,100 persons from the congested areas of Lancashire, of which 592,000 would be from the county boroughs. Certain county district councils appear to favour the accommodation of this overspill by the expansion and development of existing townships in preference to the establishment of new towns. For example, the Leyland Urban District Council would prefer that the proposed expansion of their town should be carried out by the County Council and themselves acting jointly rather than by a New Town Corporation. Other authorities have volunteered to receive overspill in preference to the establishment of new towns.

There is opposition by some authorities to Parbold being selected as a New Town site and alternatives at Burscough and Skelmersdale have been suggested. So far no opposition appears to have developed against the proposed New Town site at Garstang, but the views of the Rural District Council have not yet been received.

In North-East Lancashire county district councils have expressed considerable anxiety because of their economic dependence on a single industry, namely cotton. The point of view is developing that there should be a greater diversification of industry in this area. The present conditions of full employment and undermanning in the cotton industry are well known and the desire to avoid complete dependence on the prosperity of cotton is a problem which will be difficult of solution.

All these views and the possible action which can be taken, will be the subject of very careful consideration by the County Council. The County Planning and Development Committee have appointed a sub-committee to examine the Plan and make their recommendations thereon. This sub-committee will, where necessary, discuss the Plan with interested authorities and associations who have major objections or counter-proposals to make.

Wigan is the only County Borough Council to make observations so far; these were favourable to the proposals made in the Plan, but the County Planning and Development Committee would wish to consider the views of all the county borough councils if these are received in time.

The stage has now been reached where the County Planning and Development Committee will be asked to formulate their recommendations for the various areas to the County Council, and these will be made public when they have done so.

CHANGE OF ADDRESS

Mr. James V. T. Scott, Dipl.Arch. (Liverpool), A.R.I.B.A., Dipl. T.P (Edinburgh), A.M.T.P.I., Architect and Planning Consultant announces that his practice has now returned from the temporary wartime address at 18 Annadale Avenue, to more central offices at—22 Lombard Street (Second floor) Belfast. Telephone No. Belfast 23243.

OBITUARY

The death occurred on September 8, of Arthur William Whitwell, F.R.I.B.A., of Birmingham, aged 78.

The death occurred on September 14, of Hubert Moore Fairweather, C.B.E., F.R.I.B.A., of Sevenoaks, aged 69.

The death was announced on September 16, of Walter Alison, A.R.I.B.A., of Kirkcaldy.

ARCHITECT'S WILL

The late Charles Dempster Collins of Ashtead, Surrey, at one time Chief Architect of the London, Brighton and South Coast Railway, left £29,652.

EXHIBITION

Salisbury Cathedral Spire Restoration. Exhibition at the Building Centre including drawings, photographs and specimens of damaged materials, September 25—October 7. 10 a.m.—5 p.m. Sats. 10—1.

CORRECTION

The shop front illustrated on page 268 in *A. & B.N.* of September 8, is in Lamb's Conduit Street, and not Conduit Street as printed.

CORRESPONDENCE

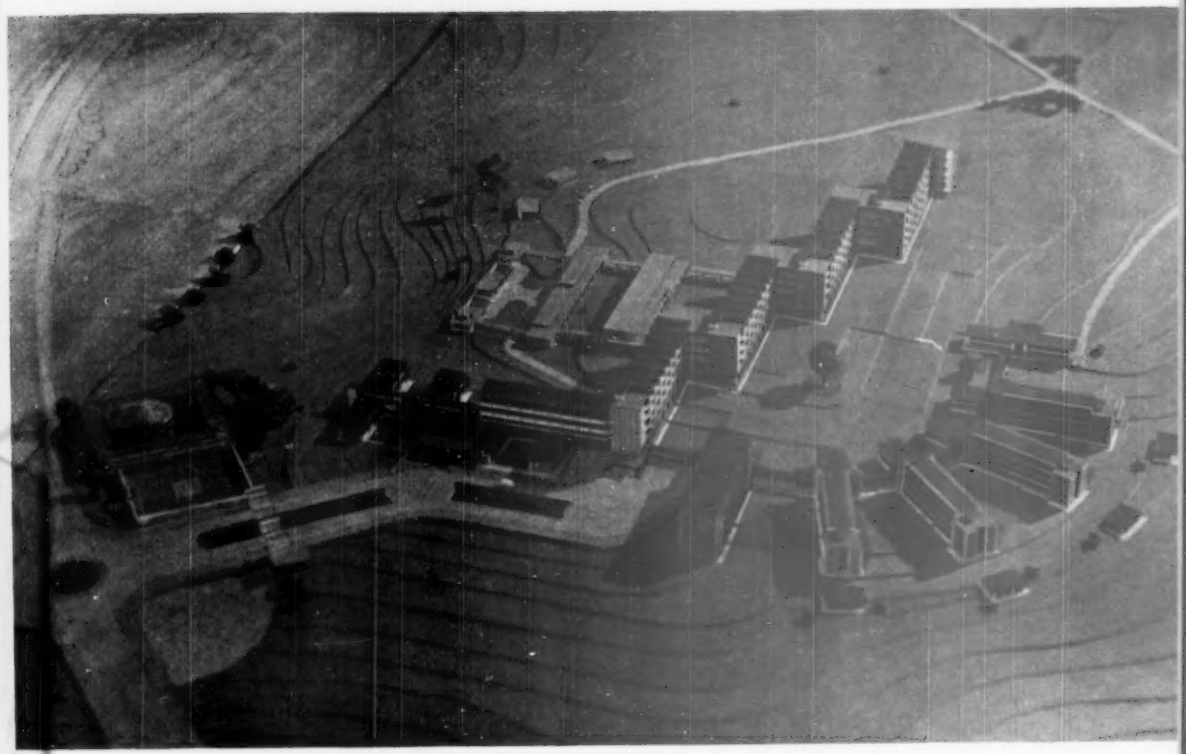
One-way Glass

To the Editor of A. & B.N.

Sir,—We are interested in the mention of "One Way Glass" on page 242 of the *Architect and Building News* of September 1. We are interested because as far as we know there is no such glass manufactured that will meet the conditions.

As a result of publication of reports such as these from time to time in trade papers, we are often worried by Builders and Architects from all over the country to supply this glass. If such a glass is obtainable, we should like to know what this is, and who are the suppliers. If such a glass cannot be manufactured we feel that reference to this in trade papers should not be made, as it is misleading and disconcerting.

We are, etc.,
JAMES CLARK & EATON LTD.



KUMASI CENTRAL HOSPITAL AND NURSES' TRAINING CENTRE, ASHANTI

designed by A. G. PATON, A.I.A.A., *Resident Architect, P.W.D.*
J. P. LOMAX, M.A. (Arch.), A.R.I.B.A., *Associate Architect, P.W.D.*
Consulting Architect : H. H. CLARK, F.R.I.B.A. *Chief Architect, P.W.D. :* A. F. D. SEALE, A.R.I.B.A.

THE provision of a Central Hospital for Ashanti is one of the several major projects scheduled for construction in the Gold Coast within the present decade. Kumasi, the capital of Ashanti, is to house at least two of these projects, the Central Hospital and Nurses' Training Centre and the Central Mental Hospital, the former project has now reached working drawing stage and tenders are to be invited from building contractors in the Gold Coast and elsewhere towards the end of 1950, the latter project is in the preliminary design stage at present and it is estimated that tenders will be invited during 1951.

The design of these projects is the responsibility of the Gold Coast Public Works Department who have now adopted the policy of augmenting their Architectural staff by engaging, on short-term contract, architects with specialised experience of the particular project for which they are engaged.

In the case of the Central Hospital and Nurses' Training Centre, A. F. D. Seale, A.R.I.B.A., Chief Architect, Public Works Department, arranged the appointment of A. G. Paton, A.I.A.A., as Resident Architect, Public Works Department, responsible for the design of the project, J. P. Lomax, M.A.(Arch.), A.R.I.B.A., as Associate Architect, Public Works Department, and H. H. Clark, F.R.I.B.A., as Consulting Architect. The illustrations show the final design as approved by Dr. J. G. S. Turner, the Director of Medical Services, and the following descriptive notes explain the principles of planning and construction adopted to suit the tropical climate and other factors peculiar to the locality.

The sketch designs and working drawings have been prepared by the architects, at Accra, under the direction of D. W. McCulloch, Director of Public Works, and with the assistance of African members of the Public Works Department Architects' Branch, the model, illustrated on this page, was constructed by N. D. V. Parkins, the Public Works Department's Model-maker.

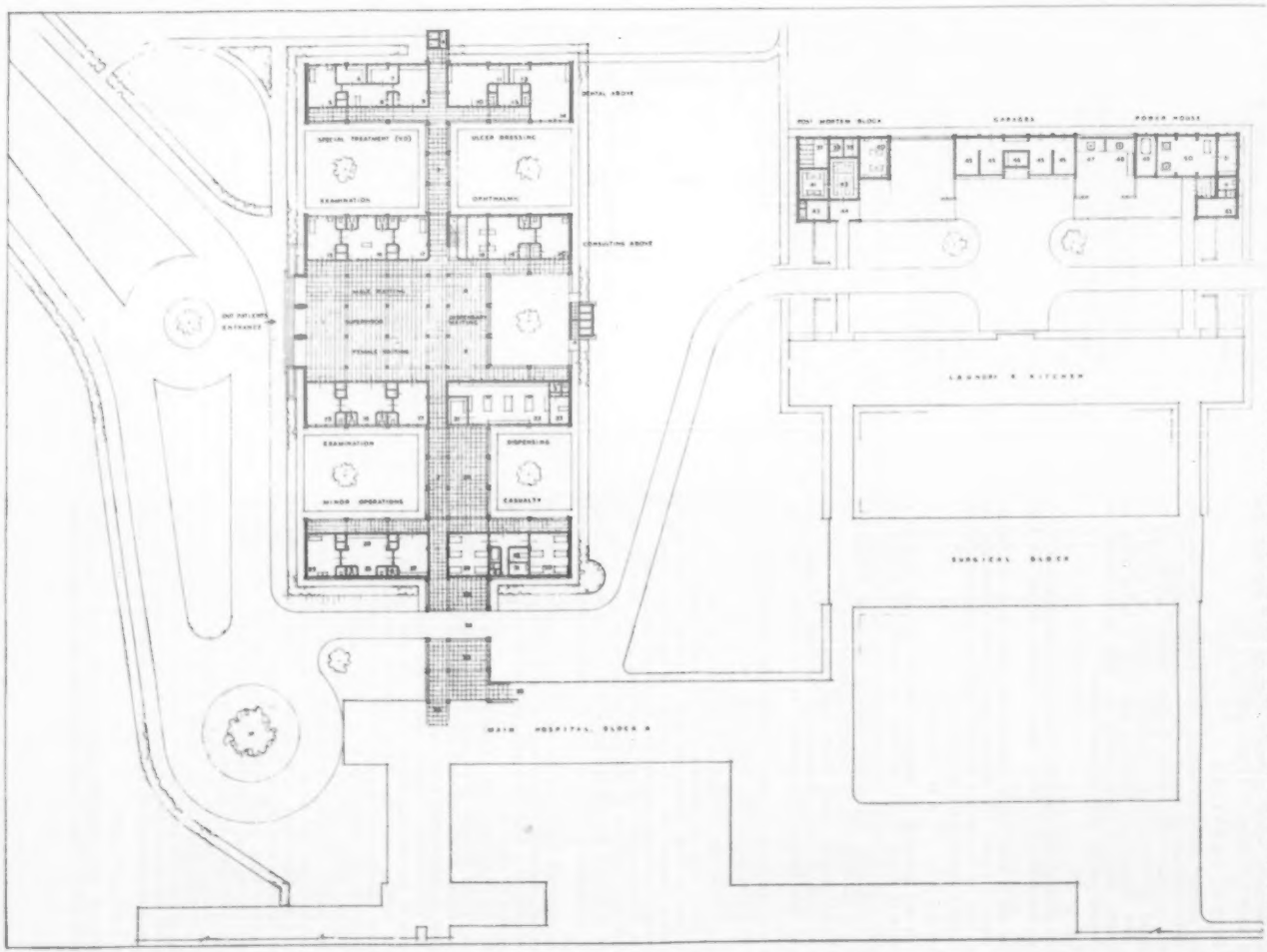
A grant of £1,000,000, from the Colonial Development Fund was available for the completion of the project; of this sum the Medical Department reserved a fixed sum for medical equipment and furnishing; the cost of the site, being upon Crown Lands, was not a charge against the project and the Architect was therefore able to plan to a definite sum for all building work, roads, services and general equipment. The services of the P.W.D. Resident Quantity Surveyor were invaluable during the preliminary stages, advising on local building costs and available materials.

MEDICAL DEPARTMENT REQUIREMENTS

No hard and fast schedule of accommodation was laid down by the Medical Department and the final provisions were discussed and agreed at meetings between the Architect and the Director of Medical Services at which the various Medical and Surgical Specialists were present; by this means it was possible to obtain specialist's opinions upon alternative plan details before the design had passed beyond the rough sketch stages.

In general the problem was to replace the existing out-moded and inadequate hospital service at Kumasi with an up-to-date teaching hospital of not less than 500 beds, with specialist services not normally possible to provide in the smaller outlying hospitals; increased Out-patient capacity up to 500 persons per day; teaching and living accommodation for not less than 330 Nurses-in-training, including Midwifery training.

Segregation on racial or religious grounds was not considered to be of importance, no provision was considered necessary for separate Kitchens to serve patients of varying races. It was decided that ward units should be identical in plan to permit of re-allocation for differing types of nursing as required.



1. out-patients' waiting hall
2. main corridor, open
3. staff toilets
4. patients' toilets
5. medical officer (v.d.)
6. laboratory
7. blood test laboratory
8. card room
9. v.d. treatment room
10. male treatment room, ulcer
11. sterilising and preparation
12. sterilising and preparation
13. nurse-receptionist
14. female treatment room, ulcer
15. medical officer, diagnosis
16. nurse receptionist
17. medical officer, diagnosis
18. dispensing optician
19. reception and treatment
20. refractionist, eye testing
21. dispensary daily store
22. dispensary
23. head dispenser's office
24. group-casualty reception shelter
25. minor operations room
26. casualty sister, duty station
27. casualty treatment room
28. sterilising and preparation
29. casualty reception ward
30. casualty recovery ward
31. sluice room
32. bathroom
33. ambulance cases reception bays
34. covered ambulance-bay
35. main hospital service way
36. lift and stair hall entrance
37. mortuary
38. refrigeration plant
39. coffin store
40. post-mortem room
41. viewing room
42. hall
43. attendants' office
44. covered, screened entrance
45. ambulance garages
46. oil and petrol store
47. refuse incinerator
48. bin scalding
49. bedding steriliser
50. steam and elect. generating power house
51. engineers' workshop
52. engineers' office

OUT-PATIENTS' BLOCK AND SERVICE BUILDINGS: LOWER GROUND FLOOR PLANS

CLIMATIC CONSIDERATIONS

Kumasi lies 6° 42′ North of the Equator and 1° 37′ 30″ West of Greenwich, the climate is normally one of fairly high temperature both night and day, with constant high humidity, day to day temperature changes being slight. Rainfall is frequent and often very heavy, a steady prevailing breeze blows from the South-West and occasional squalls or gusts reaching 65 m.p.h. blow from the East usually accompaned by heavy rainfall, 3 in. in approx. 25 minutes being the highest recorded downpour.

Between November and February the weather undergoes a distinct change, the Harmattan, a hot dry wind with its origin in the Sahara desert brings higher day temperature and lower night temperature, and is laden with fine dust, during this period a change of 38° F. in 24 hours has been recorded whilst humidity which normally averages 83.5 per cent. has been known to drop to 12 per cent.

UTILITY SERVICES

The existing public services of Water Supply and Electricity are to be increased in output to serve this new project.

The proposed water-borne sewage disposal scheme to be provided for Kumasi is not expected to mature in time to serve the new hospital and therefore provision is being made for a separate disposal system which can later be by-passed and superseded by the main disposal works.

SITE

The selected site occupies 41 acres upon an eminence 975 ft. above sea level at a fairly central location within the town limits.

The site is very evenly covered with many large and beautiful trees, a coarse but pleasant grass grows abundantly and lawns can be maintained without difficulty, wherever possible the natural growths will be preserved.

GENERAL PLAN FORM

It is not practical to design a 500 bed general hospital as a group of single storey buildings in view of the area of site covered and the length of communications, the adoption of a multi-storey form was decided upon at the outset and bearing in mind the necessity to preserve uninterrupted breeze to all ward and patients units, whilst conforming to the obviously correct East to West orientation of buildings, the main ward blocks were planned "en-echelon" as will be seen in the illustrations.

It was considered essential that the Out-patients Department entrance should be very near to the main gates in order to lessen the disturbance to Ward patients by the noise which is always a feature of such a department; for this reason the O.P. Block runs northwards from the main hospital entrance with East to West Wings arranged to present a face to the prevailing breeze, the O.P. corridor is completely open thus permitting the breeze to pass freely through to all wings.

The administration offices are situated above the O.P. block immediately adjacent to the main hospital entrance. On two floors above are housed the Septic Labour and Nursery Units each immediately adjacent to its corresponding Maternity Ward.

The Surgical Unit with its two pairs of operating theatres is centrally situated to the North of the Ward blocks and since the whole unit is fully air-conditioned, the breeze factor may be discounted in this case.

The main Kitchen and Laundry block is situated to the North of the Surgical block and due to the falls of the site is one storey lower but sufficiently removed from the main building to gain benefit from the breeze.

The Post-Mortem, Garage and Power House blocks are grouped at the extreme North of the site, this forming an enclosed service yard, the latter building provides steam to Kitchen, Laundry and Surgical Unit and incorporates a stand-by generator for maintenance of certain essential services in the hospital in the event of a mains breakdown.

The Nurses' Training Centre is treated as a separate entity approached from the main hospital by a covered way; it comprises a teaching block, four dormitory blocks and a self-contained Kitchen and Dining block. In order to provide a compact composition, whilst reducing the possibility of impeding the breeze to the main hospital, the blocks are arranged radially and linked by a covered way.

The incorporation of verandas to dormitory blocks at each floor provides shade to the rooms despite the varying orientation of the individual blocks. A housekeeper's quarters are provided adjacent to each dormitory block from which position a reasonable measure of supervision is possible at all hours.

CIRCULATION

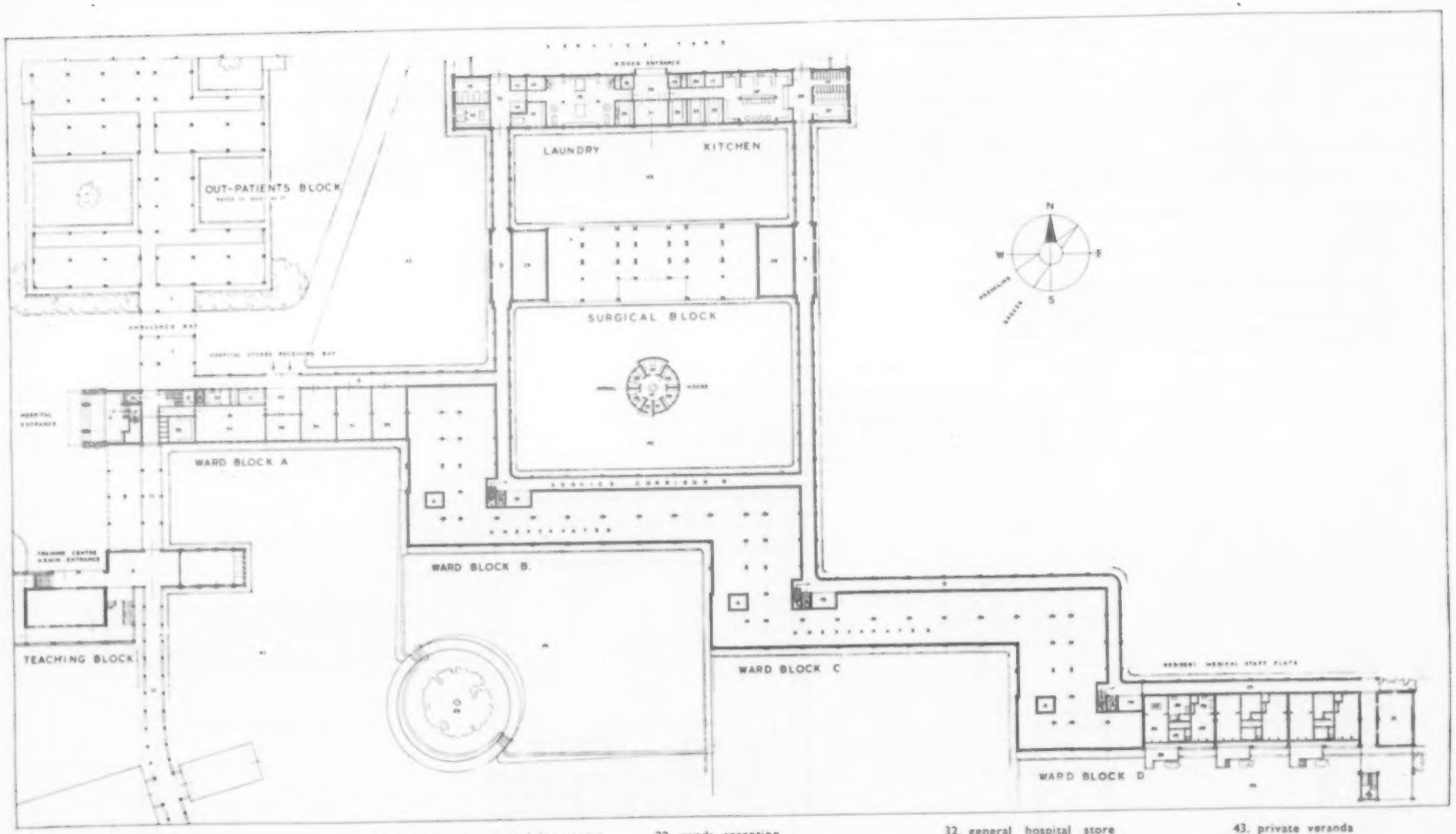
Study of the circulation diagrams will show that in this hospital use has been made of the falls of the site to obtain separation of utility services—food, linen, laundry and stores—from the normal administration and patients traffic, visitors and out-patients are similarly separated. This is achieved by the provision of horizontal access ways on two levels, the lower level serving food, laundry and stores to all floors via service lifts; the upper level has two access ways (i) for nursing staff and in-patients access from wards to Surgical Unit and Specialist Department via the passenger and bed lifts at each ward block, (ii) for visitors to in-patients and for out-patients visiting specialist departments it should be noted that the out-patients' department is not normally in operation during visiting hours.

Food and Laundry service is effected by means of lifts serving direct to the ward units.

The teaching unit of the Nurses' Training Centre is situated nearest the main hospital entrance and a large assembly hall with stage facilities is situated at its lower floor; the teaching administration offices are on the upper floor with library adjacent and the practical demonstration and lecture rooms are arranged in three storeys above. The dormitory and dining blocks are reached by means of an open covered way at lower ground level only, each dormitory has a common-room at upper floor level and separate ablution blocks serve each dormitory floor.

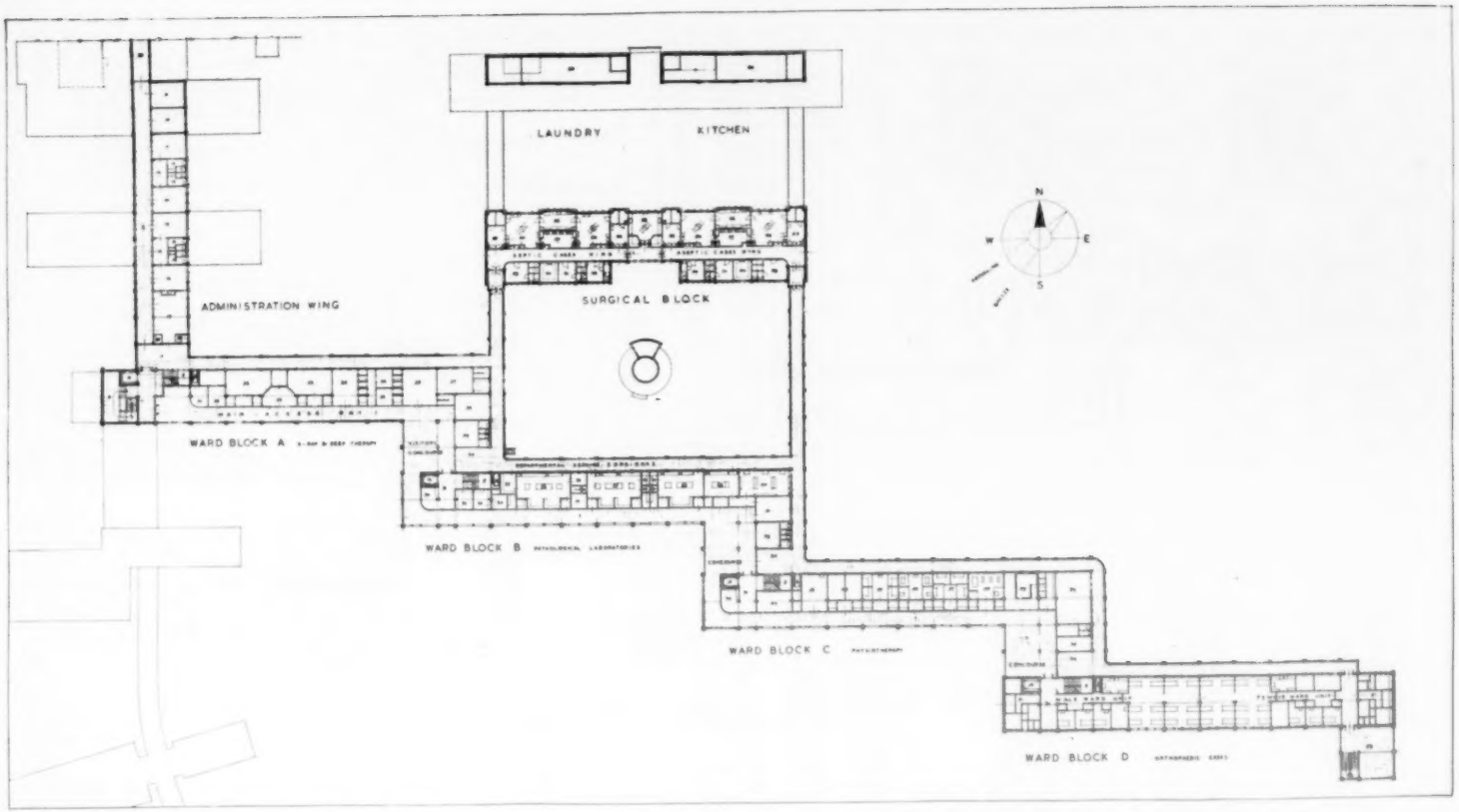
Continued on page 330

CIRCULATION DIAGRAM



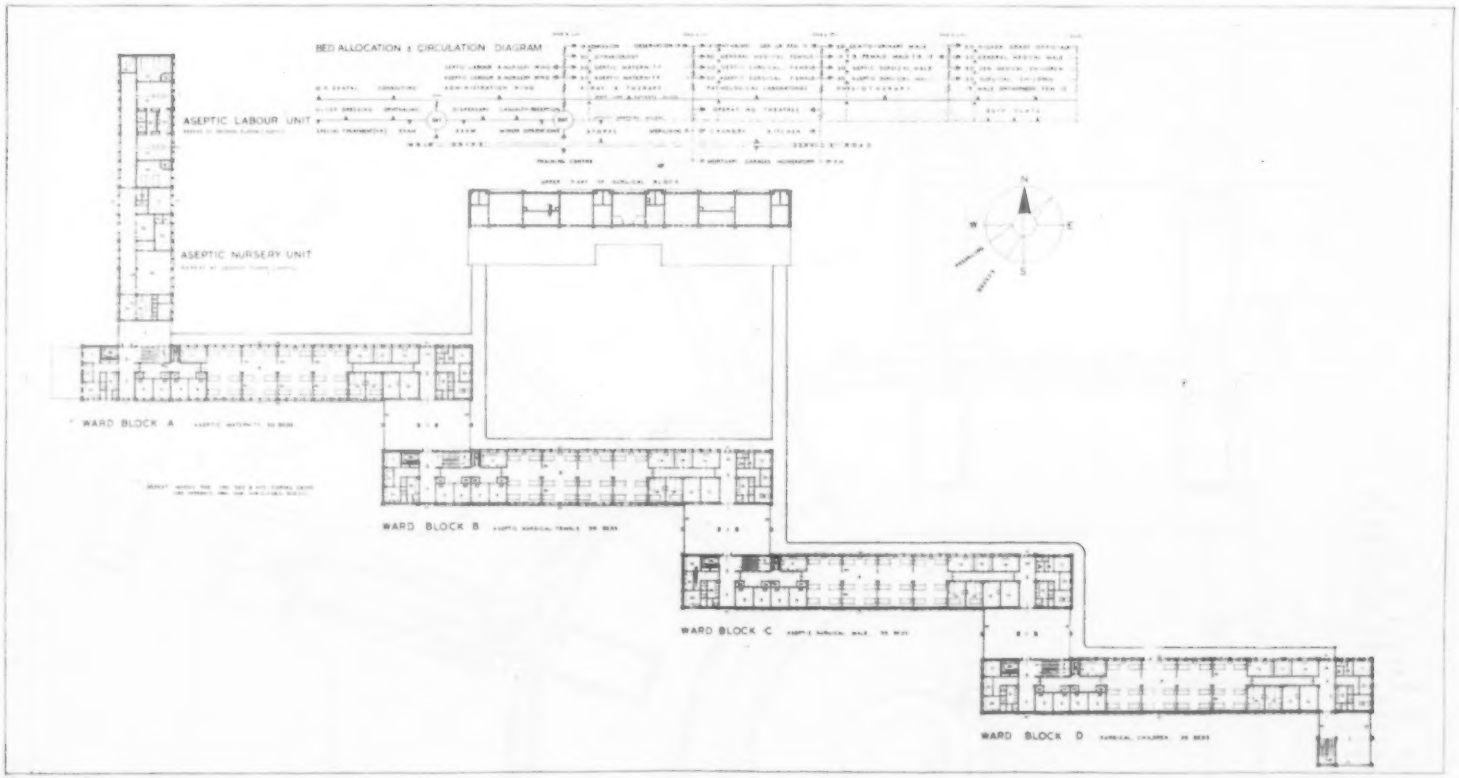
1. covered entrance
2. lower hall
3. main stair
4. bed and passenger lifts
5. ward stairs
6. service lifts
7. covered ambulance-cases reception
8. covered car park, admin. staff
9. utility services corridors and covered ways
10. service trolly parking bays
11. covered access to training centre
12. laundry block porters' hall
13. central linen issues
14. central sterilising unit
15. soiled linen disinfector and pre-washing
16. soap store
17. office
18. laundry, wash, dry, iron, press
19. staff toilets
20. linen mending and marking
21. staff rest room
22. goods reception
23. food stores
24. cold store, refrigerated
25. main kitchen, steam and electric equipment
26. food service porters' hall
27. food container washing
28. air-conditioning plant
29. main dispensary store
30. medical equipment store
31. furniture store
32. general hospital store
33. nurses' cloakroom
34. nurses' common room
35. serving pantry and buffet kitchen
36. mosquito lobby
37. fodder store
38. penned animals
39. caged animals
40. preparation and dissecting room
41. hall
42. gardens
43. private veranda
44. living room
45. dining room
46. kitchen
47. bathroom
48. bedroom
49. dressing room
50. private stoeps
51. garage, four cars
52. emergency stair
53. existing sacred tree.

MAIN HOSPITAL : LOWER GROUND FLOOR



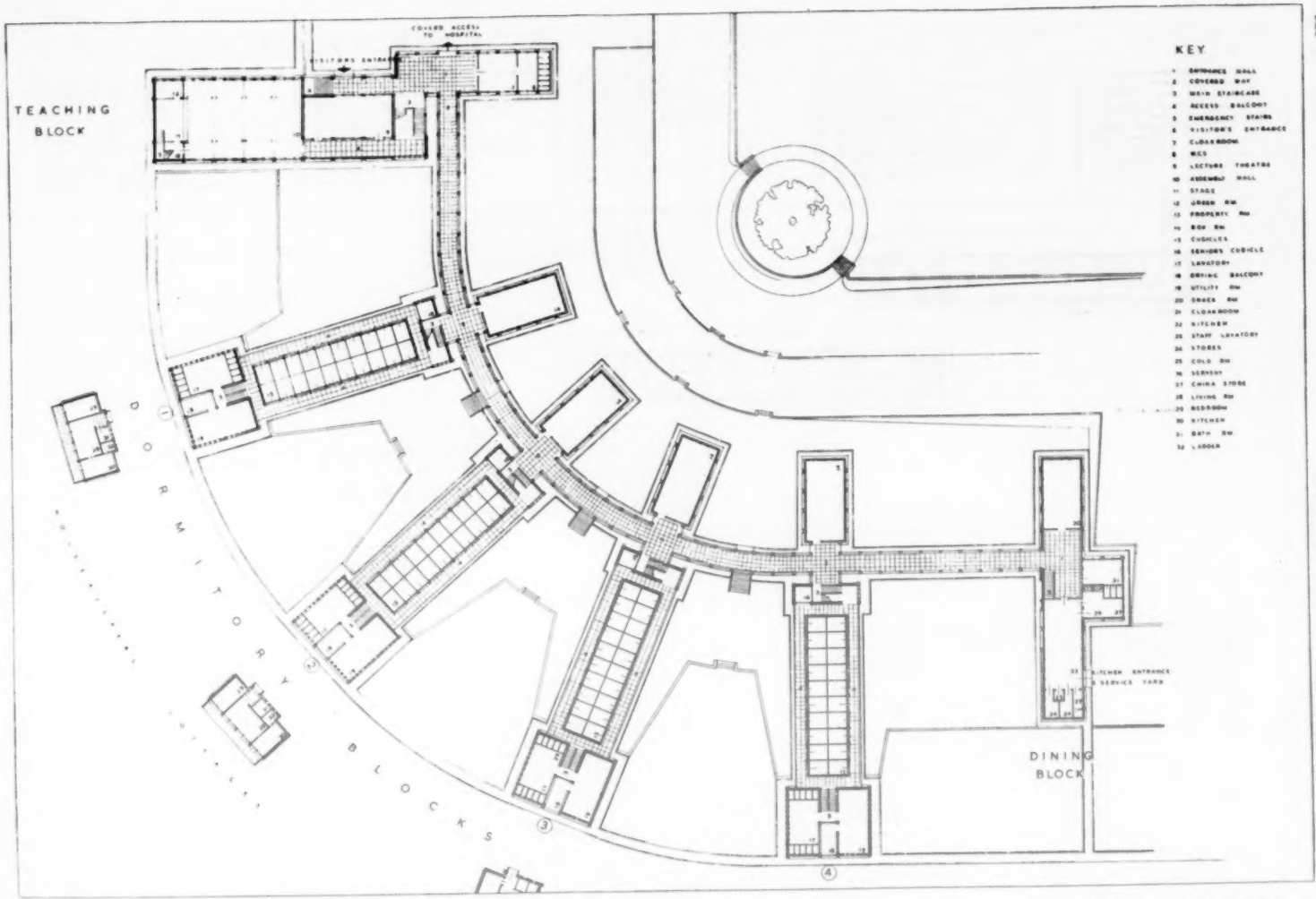
1. main access way, open
2. upper hall
3. main stair
4. bed and passenger lifts
5. ward stairs
6. service lifts
7. visitors waiting
8. admin. corridor
9. senior staff rest room
10. library
11. surgeons' common room
12. ante rooms
13. staff toilets
14. medical superintendent's office
15. matron's office
16. secretary's office
17. general office
18. telephonist
19. clerks' toilet
20. covered way to out-patients' depts.
21. sister i/c X-ray, office
22. records office
23. superficial and deep therapy
24. diagnostic X-ray
25. screening
26. waiting and changing cubicles
27. developing room
28. radiologist office
29. staff rest room
30. ward block porter
31. ward block lift and stair hall
32. laboratory specimen reception
33. laboratory records clerk's office
34. store
35. section cutting
36. pathological laboratory and micro-photography
37. biochemistry laboratory
38. bacteriological laboratory
39. pathologist's research laboratory
40. path. library and museum
41. senior pathologist's office
42. sister i/c physiotherapy office
43. senior physiotherapist, consulting
44. spare
45. mechano-therapy
46. electro-therapy
47. massage
48. hydro-therapy
49. hydrotherapeutic bath
50. gymnasium, remedial exercises
51. ward unit sanitary annexes
52. emergency stair
53. patients' covered day-balcony
54. operating theatres
55. anaesthetising rooms
56. sterilising rooms
57. surgeons' and theatre staff scrub-up
58. plaster theatre
59. theatre staff changing rooms
60. work rooms.
61. theatre sisters' changing rooms
62. surgeons' changing rooms
63. upper part of kitchen and laundry
64. service trolley bays

MAIN HOSPITAL. UPPER GROUND FLOOR PLAN

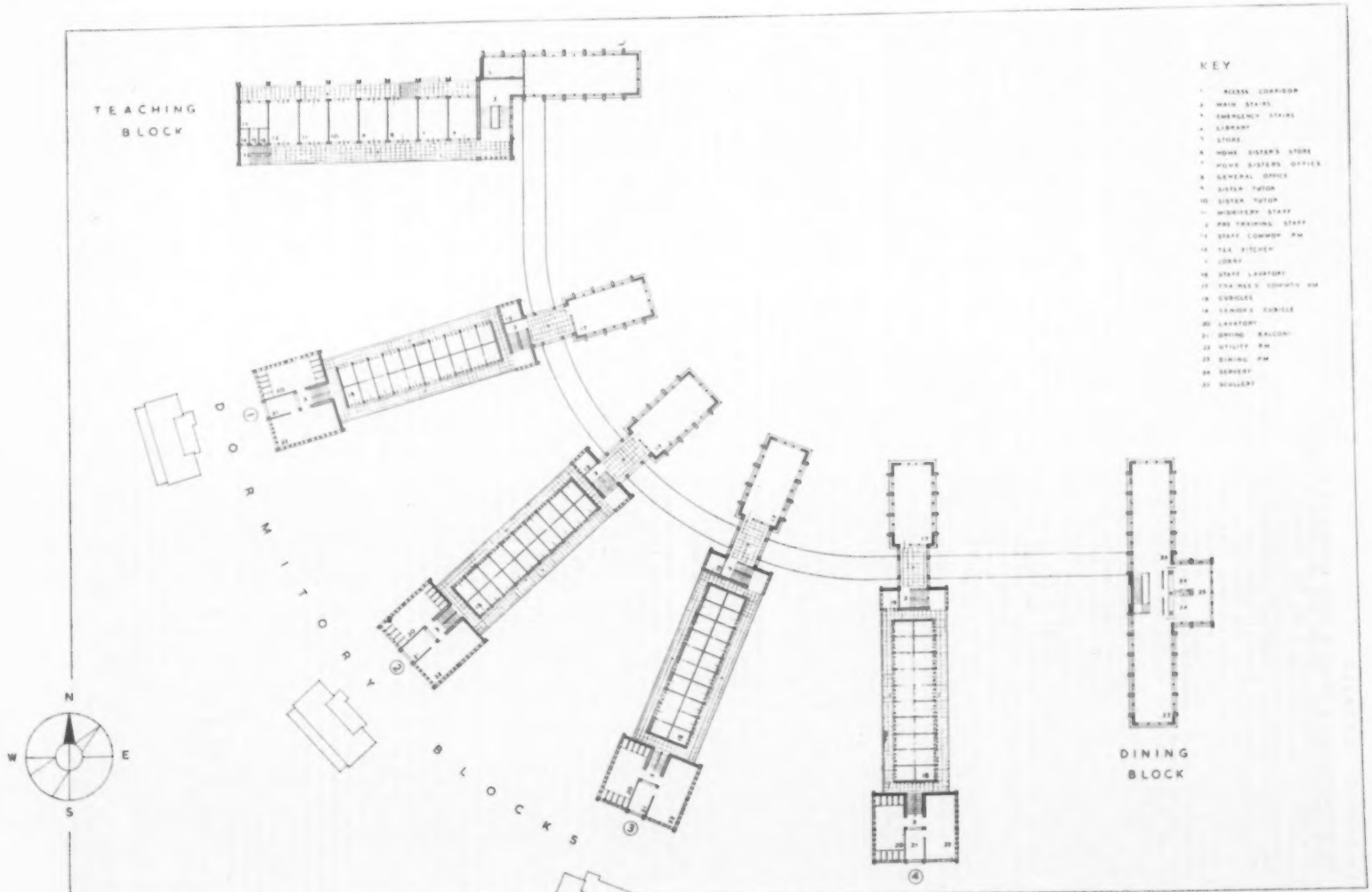


1. patients' day balconies, covered
2. open ventilating lobby
3. lift and stair hall, entrance to ward
4. bed and passenger lifts
5. ward stairs
6. service lifts
7. visitors' open lobby
8. main wards, 24 beds
9. single wards
10. single double wards.
11. ward-kitchen
12. duty room
13. linen store
14. examination room
15. special purpose room, or additional single ward
16. ward general store
17. ward sluice rooms
18. patients' lavatories, showers and w.cs.
19. treatment bathrooms
20. dressings and treatment rooms
21. ward sterilisers
22. clinical specimen rooms
23. cleaners' closets
24. staff lavatories
25. linen cupboards
26. chair storage space
27. sun-shield louvre windows
28. rainwater vertical channels
29. admission bathroom
30. pre-labour wards
31. delivery theatres
32. surgeon and staff scrub-up
33. sterilising and preparation room
34. changing cubicles, surgeon
35. changing cubicles, staff
36. sluice rooms
37. premature babies' nursery
38. duty room
39. milk room, feed preparation
40. cold store
41. dry store
42. air-conditioning plant
43. linen cupboard
44. 24-cot nursery
45. babies' bathroom
46. mosquito lock
47. protective screens
48. emergency stair
49. parents' viewing screens
50. low glazed division screens

MAIN HOSPITAL : FIRST FLOOR PLAN



NURSES' TRAINING CENTRE: LOWER GROUND AND GROUND FLOOR



TRAINING CENTRE. UPPER GROUND AND FIRST FLOOR

PLANNING DETAILS

The Out-patients Block is planned to serve a maximum of 500 out-patients per eight-hour day. To deal with this number provision is made for a Waiting Hall to seat 200, Reception and Registration Clerks, four Medical Officers, Consulting and General treatment rooms. Separated wings are provided as follows: Special Treatment (V.D.), Ulcer Dressing (Male and Female), Orthoptic, Dispensary, Minor Operations, Casualty reception and recovery ward, Dental Clinic and Consulting wing (where referred cases can be examined by the main hospital specialists), X-Ray screening and Therapy treatment, which is normally arranged by appointment, is given in the Main Hospital. A separate entrance is provided for the use of registered patients arriving for repetitive treatment at the Special Treatment and Ulcer Dressing department; this obviates the risk of infection to other patients in the main waiting hall.

The X-Ray department is situated at upper ground floor of block A and comprises two diagnostic and screening rooms with waiting space, cubicles, etc., a portable X-Ray room, two developing rooms, radiologist and radiographer's offices, staff rest room and administration rooms. Provision is made for future Deep and Superficial X-Ray Therapy rooms, the space reserved being occupied initially as Occupational Therapy rooms.

The Laboratory Department is situated at upper ground floor at Block B and comprises Pathological, Bacteriology and Biochemistry laboratories each with centrifuge room and draught-proof balance room. A laboratory is provided for the Senior Pathologist with space for visiting specialists as well as office accommodation, storage and a combined Library and Museum. A separate Staff rest room and toilet is provided. The Animal House is situated in the adjacent courtyard and is a completely separate structure planned to accommodate caged and penned animals with treatment and autopsy room and fodder store.

The Physiotherapy department on upper ground floor level of block C is planned to provide Electro, Mechano, Massage and Hydrotherapeutic treatment and has a small gymnasium attached immediately adjacent to the Orthopaedic Wards at the same level.

The Administration Office Wing is approached from the main entrance hall at upper ground floor level and provides offices for senior staff, secretary and clerks in addition to senior staff rest room and a main library, its access corridor leads on to link with the Out-patients Consulting rooms thus planned to be at a convenient place where O.P. and Specialist staff may meet to discuss referred cases requiring consultation with one or more specialists.

The Maternity Units, septic and aseptic, are planned as identical groups each comprising a 30-bed ward unit, a labour unit with two pre-labour wards, two labour (delivery) rooms and central scrub-up and sterilizing rooms; a Nursery unit with space for 20 cots in addition to the premature babies air-conditioned nursery. Provision is made for visitors to view babies without entering the unit proper.

General Ward Units are planned to permit future alteration by the addition of partitions to provide more single rooms or to form two separate units by means of a division across the main ward. Each unit as planned provides a 24-bed main ward with beds arranged parallel to the external walls, six single or private wards for special equipment, linen storage and general storage. The positioning of the Sanitary Annexes was the subject of a great deal of thought and discussion and it was finally agreed that despite the additional distance from the main ward, they should be planned as separated units at each end with complete through-ventilation cut-off lobbies between to isolate them from the ward; it is an accepted fact that under tropical conditions the most vigilant supervision fails to maintain sanitary annexes in a condition which permits of more convenient planning. These annexes contain patients' toilet and ablutions, sluice-rooms, ward sterilizer and clinical specimen rooms, dressings and treatment room, treatment bathroom, cleaner's closet and staff toilet; the cut-off lobby provides space for trollies and terrace chairs and waiting space for patients' visitors. Each Ward Unit has a day-terrace adjacent for use by patients who are not completely confined to their beds, the use of balconies alongside the wards has been purposely avoided since it has been found that the noise produced by the up-patients can cause considerable distress to bed patients within the wards. The terraces form the links between the main ward blocks at each floor and thus provide secondary emergency exit routes. Senior Staff are also able to use this route—by means of a pass-key—to shorten their rounds if desired; similarly, trolley cases would take this route in the event of a bed-lift breakdown. Provision is made at each bed-head for pillow-radio, individual lighting, examination light socket, portable X-Ray connection and bell-call system. The windows to wards are of the "balanced-louvre" type specially designed to provide complete shade and protection from sky-glare whilst preserving maximum through ventilation, the use of non-actinic glass for the forward opening panes produces a "brise-soleil" effect without impeding vision.

The lower ground floor at block A occurs at existing ground level and contains the nursing staff common-room and toilets, the main stores—served by loading-bay from the service road—and the transformer room. The service way connects at this level to all service lifts and the main Kitchen and Laundry block, by this route a corpse may be removed from any ward to the Post-mortem block without crossing patients, nursing-staff or visitors' normal access ways. The lower ground floor level at Block D houses three flats for resident Medical Officers who have direct undercover access to all parts of the hospital, garages are included with access from the service roads.

The Surgical Unit is served from the staff and patients access-way with separated septic and aseptic wings, each wing contains the same accommodation, viz., a pair of operating-theatres grouped around central scrub-up and sterilizing rooms, anaesthetizing room to each theatre, stores and preparation room, changing rooms and toilets for theatre sister, theatre staff and surgeons. The whole block is fully air-conditioned from chambers situated below and approached from service corridors. A plaster room is situated between the septic and aseptic units and is accessible to either as the occasion demands. The air-conditioning system (including ozonisation) is intended to relieve the oppression which arises in enclosed rooms but the drop in temperature and humidity will be slight since medical opinion considers excessive reductions to be prejudicial to the success of the operation.

The Main Kitchen equipment will be operated by live steam and electricity and the food will be prepared in bulk for delivery to ward kitchens in insulated trollies, the unit includes a trolley room and food container wash-up room directly accessible from the service corridor. The food storage space is relatively small since it is the policy to avoid storage of fresh food so far as possible and to rely upon daily intakes thus avoiding wastage through deterioration.

The Laundry Block provides for steam-operated washing, drying and pressing equipment and incorporates a disinfector, linen repair and issue rooms in addition to staff toilets and rest room.

The Central Sterilizing room is adjacent to the Laundry and has direct access to all sections of the hospital via the lower service way.

The Post-morten Block is sited to the north of the service yard with direct ambulance and hearse access; it contains an air-conditioned Mortuary, double Post-mortem room, viewing room, hall, coffin room and office; its entrance is screened from public or patients' view.

The Power-house is intended to house the boilers which will provide live steam to the Laundry, Kitchen and Surgical Units and also the Bedding Sterilizer and bin sterilizing equipment. A stand-by generator will be included to maintain certain lifts and essential services in the event of a failure of the main electrical supply.

Garages and fuel store are planned in a central block to the north of the service yard.

Maintenance Staff living quarters are nearby the service yard in order that the staff may be readily available to deal with mechanical faults; with the exception of the nurses-in-training the whole of the nursing staff are housed outside the hospital site.

The four Dormitory Blocks house 338 trainees in all, made up as follows: Pre-trainees, 80; Juniors, 160; Seniors, 42, plus 14 acting as dormitory supervisors; Midwives, 42.

CONSTRUCTION AND FINISHES

The services of Mr. W. V. Zinn, A.M.I.C.E., have been obtained in connection with the design of the reinforced concrete frame and floors. Adequate local supplies of sand, crushed stone aggregate and a lightweight timber (with negligible shrinkage) are available and since local labour is well acquainted with the execution of reinforced concrete structures it has been decided that this method offers the most economical and practical solution.

The whole plan is based upon a simple 15 feet by 20 inches grid layout and the architect's intention is to express the R.C. framework in the finished appearance, this being the logical and honest result of the repetitive plan form and its mode of construction. The problem of disposal of surface water from the roofs of the multi-storey blocks led to the adoption of vertical open fronted rainwater channels constructed as part of the columns; rainwater pipes of normal sizes would not cope with the torrential downpours which occur, these channels impart a pronounced vertical feeling to the whole composition.

The flat roofs, generally, are of solid construction with the addition of lightweight precast concrete tiles loose-laid to provide a few inches of air-space for the purpose of dissipating the heat produced by direct sun rays; the roofs over the Ward Units are of double construction, the upper roof taking the form of barrel vaults.

Floors throughout are of solid construction with sound insulating materials incorporated in the finishes, ward floors will be of cork or similar resilient materials which are at present under consideration.

Wall finishes, internally, will be enamel paint upon plaster for most rooms, flush finishing granolithic covered skirtings will apply throughout.

Doors will be of the solid-core laminated flush type hung in metal frames.

Externally the framework will be clad between columns with precast concrete panels, in some cases these will incorporate moulded designs based upon authentic examples of Ashanti decoration, this, together with large areas of local stone walling and the use of external colouring will assist in imparting some of the local building tradition to a building which by its very nature and scale would otherwise be alien to the locality.

BUILDING PROGRAMME

It is expected that construction work will commence at the end of 1950 or early 1951 and will proceed in two definite stages; the first stage involves the vacation and demolition of the existing North Wing hospital buildings and the construction of the new Out-patients Block, two Ward Blocks, the Surgical Unit and Service Buildings, all of which are to be equipped, and in working order by June, 1952, when the South Wing patients will transfer to the completed portion of the new hospital leaving the remainder of the site clear for the completion of the project which is scheduled for May, 1953.

POINTS FROM PAPERS

THE MEANING OF RESIDENTIAL DENSITY

Extracts from the paper read at the Town and Country Planning Summer School at Nottingham University by C. D. BUCHANAN, B.Sc., A.M.T.P.I., A.R.I.B.A., *and* D. H. CROMPTON, A.M.T.P.I., A.R.I.B.A.

WHAT are the essential physical needs that must be met in a residential area and which would obviously be affected by alterations in density? We suggest these needs can be broadly summarised under four headings:

1. There must in any residential area be enough living accommodation arranged in a suitable variety of dwellings, or, in other words, the density of people within their dwellings must be satisfactory.
2. The dwellings themselves must be so arranged on the ground that the rooms get sufficient light, air, sunshine, and there should be some open space closely attendant upon the dwellings which can be used for casual exercise and sitting out and as a visual relief from bricks and mortar.
3. The dwellings should be conveniently sited in relation to shops, schools, open space, and other places that the residents have frequent need to visit.
4. The residential area as a whole should be conveniently related in both position and scale, to the rest of the town, allowing reasonably good access to the town centre, and main areas of employment, and the other residential areas.

These four needs correspond to four quite distinct physical aspects of residential density. It is important to understand that they are separable, for deficiencies in any of them, separately or combined, can readily be seen in any large city. A good deal of confusion of thought on residential density has resulted from a failure to distinguish these four separate aspects of density. Each aspect will therefore be discussed separately in some detail.

1. *Density within Dwellings*

For satisfactory living conditions in an area there must be enough accommodation to meet the needs of all the different households. Now the physical planner's problem is only very rarely the actual design of accommodation for a specific group of people, usually he is concerned with saying how much accommodation a given number of people will require and how much land this accommodation will need, and he has to do all this years in advance of the needs actually arising. In most cases the best he can do is to state the accommodation requirement as a bulk quantity in some convenient unit. The choice of a unit presents certain difficulties. The dwelling itself is clearly useless for this purpose, for to define the accommodation in an area as consisting of so many dwellings would give us no real idea of the amount of accommodation unless the separate sizes of the dwellings were also stated, and it would be impossible to determine long in advance of development the likely sizes of dwellings. Other possible units for the bulk measurement of accommodation are Floor Area, Cubic Content, Bedrooms, and Habitable Rooms. For various reasons the first three of these give too vague an indication of the numbers of people likely to be accommodated. The habitable room (which includes rooms such as bedrooms, living rooms, dining rooms, but not kitchens, bathrooms or the like) is, on the other hand, a most useful, flexible unit which can readily convey an idea of the number of persons likely to be accommodated, and has the great advantage of being independent of the size or type of dwelling.

In a dwelling the ratio of occupants to the number of habitable rooms will give a measure of the intensity of occupation of the dwelling. This ratio has been given the name of "Occupancy Rate". In the Ministry of Health Housing Manual (1949), against each dwelling type is stated the number of persons it would normally be expected to contain, and the resulting Occupancy Rates vary from 1.0 to 1.3 persons per room. The variation is mainly due to differences in family composition and hence to the extent to which bedrooms can be shared. These dwelling types all represent the least amount of accommodation necessary to give reasonable standards of comfort and privacy and the Occupancy Rates might therefore be regarded as minima for new dwellings. The Rates are equally a guide to conditions in existing dwellings, judged against the same standards, and if, in any such dwelling, the rate is found to be much in excess of 1.0, it is probably evidence of shortage of accommodation. The latter will not always be true, for the composition of the family may be such that a fairly high Occupancy Rate causes no undue discomfort, but in general a rate above 1.0 may be taken as a warning. However, statutory overcrowding is not deemed to exist until the Occupancy Rate rises to between 1.5 and 2.0, children under one year not being counted and children between 1 and 10 years being counted as half persons.

If a large number of dwellings were being built over a big area it would not be satisfactory to assume that a minimum Occupancy Rate should obtain in each and every dwelling. A proportion of more spacious dwellings would be required, and allowance would have to be made for some of the dwellings being under-occupied some of the time.

We have suggested the habitable room as a convenient unit for the bulk measurement of accommodation, and the Occupancy Rate as a means of measuring the density of people within dwellings. The two together enable the planner to say how much accommodation, in bulk, a given number of people will require. For the planner to say how much land is required for the bulk quantity of accommodation, he will clearly have to consider the way the dwellings are themselves arranged on the ground. The planner is seldom in a position to be precise about such matters. All he can do is to be knowledgeable about the kind of dwelling needs likely to arise and to have a good idea of the possibilities in dwelling arrangements at any specified density of accommodation to land. This brings us to our second aspect of density.

2. *Density of Dwellings on the Ground*

It is the density of areas consisting of dwellings only that is being considered, to which can be given the name of Net Accommodation Density.

The density considerations applying to flats are likely to be somewhat different to those applying to houses, so we will consider these types of development separately. It is clear that a dwelling composed of very large rooms takes up more space than a dwelling containing the same number of rooms of a smaller size, and would therefore be, or tend to be, associated with a lower density. Room sizes are, of course, subject to considerable variation largely depending upon what the occupants can afford, but on the assumption that municipal housing is being considered, then an analysis of the designs shown in the Housing Manual shows that the ratio of gross dwelling area divided by the number of habitable rooms averages between 200 and 250 sq. ft. In luxury dwellings this ratio may be as high as 500 sq. ft. per habitable room. In the remarks that follow, the Housing Manual ratios will be followed generally, but it should be understood that if room sizes are substantially increased, then the effect on density may be considerable.

(*a*) *Areas Developed with Houses*

An important purpose of providing accommodation in the form of houses—detached, semi-detached or terrace—is so that the occupants may have a private garden. The desire to provide useful garden shapes results in each of the three house types being associated with a fairly definite range of site size. Thus detached houses range from say 1 to 10 sites per acre, semi-detached houses from 5 to 16, and terrace houses from 11 to about 30 sites per acre are possible, with reasonably shaped sites. The acceptance of minimum garden sizes, and other minimum requirements for access, daylighting, sunlight and privacy, sets a limit to density for houses. For two- and three-storey terrace houses, the maximum theoretical densities are, we suggest, 100 and 120 rooms per acre, where gardens are as small as 35 ft. long, and sites are level and economical in shape.

In our view, useful layouts of three-storey terrace houses can be achieved at densities as high as 80-90 rooms per

acre, given a flat regular site; and useful mixtures of semi-detached and terrace houses can be had at 50-65 rooms per acre. Many planners say these figures are too high. When we look into their reasons we nearly always find either that they want to give larger gardens, or they insist upon scattering small open spaces thoughout their net residential areas or both. We are not necessarily objecting to this, we are only saying that given minimum garden sizes and a minimum of casual open space it is possible to plan small residential areas at the densities we have mentioned whilst securing all the essential needs such as daylight, access, etc., and some pleasantness of scene. We would like to mention, in passing, that in some recent examples we have seen, the provision for small greens and verges amounts to anything from 3 to 6 acres per 1,000 rooms, and we wonder whether this is not overdoing it when 7 acres or so of public open space per 1,000 people are supplied in addition.

(b) *Areas Developed with Flats*

Turning now to the ranges of density appropriate to areas developed with flats only, it is evident that the controlling factors are the way the flats are arranged inside the blocks, the number of storeys, and the length and depth of the blocks. These in turn are governed by the spacing of blocks required to give daylighting, sunlighting, noise and fire insulation, and good access. A further need, and a difficult one to analyse, is for outdoor living space and semi-private gardens. Our investigation of these aspects has given us some idea of the densities appropriate for areas consisting of blocks of flats only.

For simple rectangular-shaped blocks laid out in parallel rows the spacing required for adequate daylighting will limit densities to about 120 rooms per acre for low blocks, up to about 180 rooms per acre for taller, longer blocks. Other layout arrangements, encouraged by the use of Daylight Indicators and being in the main varieties of the broken cruciform would make higher maximum densities possible, depending on a number of variables, sometimes as high as 200 to 300 rooms per acre.

We are prepared to say that at these densities it is possible to secure daylighting, sunlighting (except in special circumstances), insulation and access. These are straightforward, assessable factors; the doubtful one is the amount of space required around blocks for outdoor living.

(c) *Areas Developed with Houses and Flats*

In practice, of course, large areas of housing are likely to consist of a mixture of dwelling types. The average density of such areas can be considered as depending on the proportion of the total number of rooms that are contained in houses and flats respectively, and upon the relative densities of each. *Figure* 1 illustrates this relationship. It shows how, for a given density of the whole area, the proportion of rooms that may be in houses is limited by the densities of the parts with houses and the parts with flats. Densities of 40, 60 and 80 rooms per acre for houses, with 100 or 160 rooms per acre for flats have been assumed for purposes of illustration. Thus the suitable

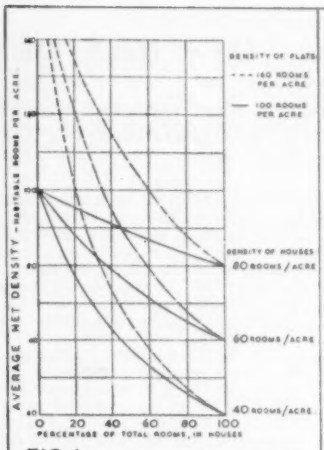

AVERAGE NET DENSITY - HABITABLE ROOMS PER ACRE
DENSITY OF FLATS
160 ROOMS PER ACRE
100 ROOMS PER ACRE
DENSITY OF HOUSES
80 ROOMS/ACRE
60 ROOMS/ACRE
40 ROOMS/ACRE
0 20 40 60 80 100
PERCENTAGE OF TOTAL ROOMS IN HOUSES

FIG. 1. DISTRIBUTION OF ROOMS IN HOUSES AND FLATS, FOR VARIOUS AVERAGE NET DENSITIES.

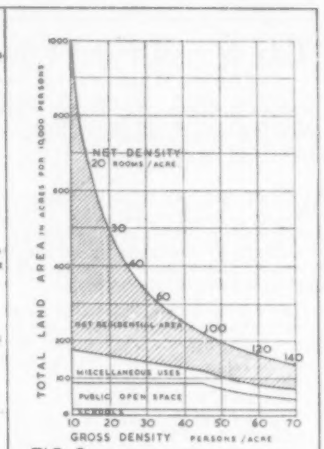


FIG. 2 RELATIVE IMPORTANCE OF THE FOUR MAIN RESIDENTIAL USES WITH VARIOUS GROSS DENSITIES

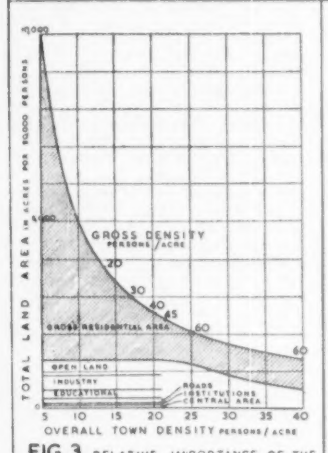


FIG. 3. RELATIVE IMPORTANCE OF THE MAIN LAND USES IN A TOWN, WITH VARIOUS OVERALL DENSITIES.

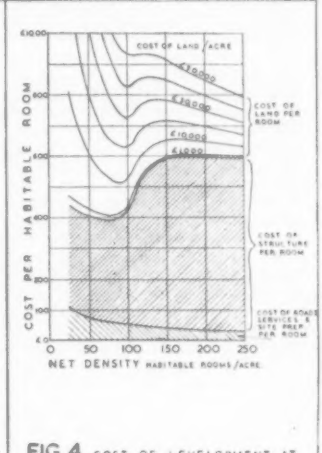


FIG. 4. COST OF DEVELOPMENT AT VARIOUS NET DENSITIES.

average Net Accommodation Density for an area can only be given by an analysis of the three parts of the problem—the desired allocation of rooms in the different types of dwellings, the desired density of flats and the desired density of houses.

Provided one is not committed to rigid ideas about the separate densities of houses and flats at the start, we see no difficulty in allocating a fairly generous proportion of the accommodation to houses with an average Net Accommodation Density up to about 90 rooms per acre. Above this figure, the proportion of flats must rapidly increase.

We feel we should try to answer the question whether any definite proportions can be laid down for houses and flats. Conditions throughout the country are far too variable to permit of any general rules, but we think it is worth while giving the results of a study made by our sociological colleagues into the needs of a group of 10,000 so constituted that all age groups are well represented in it.

The main findings of this analysis were that for a stable group of 10,000 persons, 73 per cent. of the total number of rooms would be required in houses, 20 per cent. in flats and 7 per cent. in old people's dwellings, and secondly, that out of the variety of dwellings needed, no single size of accommodation is likely to claim more than 25 per cent. of the total accommodation. This conclusion is based on assumptions which put families with children into houses and a proportion of the smaller households of adults and single persons into flats. It is also based on the assumption that the group of people contains a distribution of households approximate to the national average. This assumption may not always apply in practice. Many authorities, confronted with long waiting lists, will seek to deal with the most urgent cases first. This may well lead them to the development of large estates consisting of family dwellings only. Though there may be

strong arguments for this practice on grounds of expediency, there are also good arguments for suggesting that large estates should be planned so that they eventually accommodate a variety of households in a variety of dwellings.

The maximum density at which the proportions of houses and flats just mentioned can be secured seems to be about 90 habitable rooms per acre.

3. *Density over the Whole Neighbourhood*

It seems generally accepted that the following are the minimum facilities required:

Everyday shopping;
Schooling to primary standard;
Some public buildings—community centres, etc.;
Some public open space;
Some industry, mainly that connected with the running of the area.

The term "neighbourhood" has come to be applied to residential areas having a fair measure of self-containment for these facilities, and it will be convenient to use this term in its purely physical sense.

The planner requires a unit either to enable him to gauge approximately the conditions, in respect of the space available to people for their various needs, in an existing residential area, or to enable him to estimate for given conditions the total amount of land a group of people will require for their accommodation and other needs. It would therefore appear that the fundamental relationship is one of people to space, and that a suitable unit in which to express density is the number of people occupying a unit area. This is in fact the basis of the now well-known method of expressing gross density in "persons per acre."

Any particular figure of persons per acre can only be, of course, an approximate indication of conditions.

We now return to the question of space required for the various facilities. The needs of schools have probably been defined more clearly than others, since in the 1944 Education Act and accompanying Regulations, the areas to be aimed at by local education authorities for schools and their playing fields are given with precision. Broadly speaking the land required for primary education amounts to 1.7 acres per 1,000 people of which about .6 acres is for school playing fields.

Recent recommendations for public open space per 1,000 persons vary from 6-10 acres. We suggest that it is probably all to the good that there is no statutory standard for open space, and no more than a rough measure of agreement amongst the advisory recommendations. For not only do towns present quite different problems in the matter of securing more open space, but it is also possible that some towns, particularly those with easy access to the countryside or coast, may not need as much open space as others. Furthermore, the standards of public open space, especially for public parks, may need to be varied with various net residential densities.

The amount of land required for the remaining facilities in the neighbourhood—shops, public buildings and service industry—occupy relatively little space and therefore have relatively little effect on gross density. The following data is based on the Design of Dwellings Report (1944):

USE	AREAS IN ACRES PER 1,000 REQUIRED AT GROSS DENSITIES OF: 20	30	50	60	70
Shops	.9	.8	.7	.6	.6
Public Buildings	1.1	.8	.6	.5	.5
Service Industry	.7	.6	.5	.4	.4
TOTAL	2.7	2.2	1.8	1.5	1.5

There is still one important land use of which no account has been taken; this is the land required for main streets and car parking. The land required for minor streets has been taken as part of the net residential area, but the main circulation streets will require additional land. This need is a heavier use of land than any of the other ancillary items, and figures are likely to vary from about 4 acres per 1,000 at a gross density of 10 persons per acre down to 1 acre per 1,000 when gross density rises to 70 persons per acre.

Having rapidly analysed the main land uses we can now put them together. The relative importance as consumers of land of the four main components of a neighbourhood is illustrated in *Figure* 2. In this diagram the areas required by the four components of a neighbourhood of 10,000 people have been plotted vertically above one another. Fixed standards of 7.0 and 1.7 acres per 1,000 people for open space and schools respectively have been assumed up to a gross density of 45 persons per acre; open space rates are thereafter reduced to enable reasonable net densities to be attained. The land for the net residential area appears as a curve corresponding to gradually increasing net density. The main point of interest in this diagram is the way in which increases of gross density cause a rapid reduction in the amount of land available for housing. The lesson is that increases of gross density within the range of 10 to 40 persons per acre, which may be genuinely intended to secure a saving of land, should not be undertaken unless the consequences are clearly understood. A quite small and apparently harmless increase of gross density may in reality have a drastic effect on housing conditions. Above a gross density of 40 persons per acre, the land occupied by dwellings becomes progressively less compared to other uses, and reductions in the latter will therefore be of more significance from the point of view of economising land.

4. *Density over the Whole Town*

Here we wish to consider what land uses occur in a town in addition to the neighbourhood uses that have already been mentioned, and to see whether there is any relationship between the areas occupied by these uses and the numerical population of the town. There are a great many different land uses in a town and our first step has been to reduce these to a simple classification comprising groups of allied uses. We suggest six groups as follows:

GROUP	CONSTITUENT USES
1. Residential Areas	All neighbourhood uses as defined in the previous section.
2. Central Areas	The town's central shops, offices, public buildings and wholesale warehouses.
3. Industrial Areas	Light industrial, industrial and special industrial uses; railways and goods yards, gas works and power stations
4. Educational Uses	Secondary schools; colleges and technical schools; large independent schools, universities. All inclusive of their playing fields.
5. Open Land	Large parks; private playing fields; unused land, etc., not included in residential areas; allotments
6. Large Establishments	Hospitals; barracks; asylums

Our next step was to examine a number of existing towns and to measure up the land uses according to this classification. Several interesting points emerged from this. The first is the wide variations of overall town density that existing towns display.

On the whole the figures of overall density are remarkable for their diversity and the real explanation may well lie as much in differences of topography and other physical characteristics of the site as in any other factors.

When the areas occupied by the main land use groups are examined in more detail, it is apparent that some groups are not only more important than others in respect of the proportion of the total town area that they occupy, but are also more subject to variation. Thus in most towns the central area is a relatively small part of the whole whereas the residential areas may together constitute as much as 50-60 per cent. of the whole area. And again, the size of central areas depends broadly upon the number of people served, and variations as between town and town are mainly accounted for by this factor rather than by differences of design or layout; on the other hand the size of residential areas may differ markedly from town to town, and the differences may be as much due to variety in design and density as to differences in the number of people accommodated. Examined in this light the six land use groups sort themselves very broadly into two categories—the major land users (Residential Areas, Industrial Areas and Open Land) and the less important land users (Central Areas, Education and Large Establishments). It will be understood that these are wide generalisations. Their purpose is to give some idea of the range of overall density that existing towns display, and an indication of the relative importance as consumers of land of the main land uses occurring in existing towns.

It seems then that in towns the residential areas are the largest land consumers, but yet they show great variety of size and density from town to town. How, then, are we to know what densities to choose in replanning? Are there, or should there be, any rules connecting residential density with town size or character; or are there particular densities appropriate to particular parts

of towns, for example, should densities be high in the middle of the town and lower further out?

In considering this problem, it is helpful to recall the way in which most of our towns have developed. Most towns show a roughly similar density structure as a result of a common process of growth; it consists of a central congested core, surrounded by residential development tending to decrease in density as it lies further out from the centre. This widely-spread characteristic was doubtless the foundation for the general planning practice of the inter-war years of zoning residential areas in rings of decreasing density outwards from the town centre. The characteristic density-structure upon which inter-war practice was based was mainly the result of a period of unplanned growth, and it may not be the best model for present needs or those forecast for the next 20 years. Low density estates on the outskirts of towns have given rise to many problems particularly in relation to journey-to-work, schooling and shopping, and the provision of services; and in not a few cases the density has dropped so low that no cohesion of the kind implicit in the idea of the neighbourhood is discernible and there is a waste of land as well. At the same time residential redevelopment has taken place in inner parts of towns at high densities and on a scale which has resulted in overburdening of shopping and other facilities. Even here, in inner areas, long journeys to work have often become necessary because the increased population cannot all be employed locally. In some, perhaps many, cases it will admittedly be necessary to accept for a long time a town structure markedly disposed in rings of decreasing residential density, but it is as well to question whether those who need to live in houses should inevitably be forced to the outskirts of the town, and whether those who prefer to live in flats should be obliged to live close upon the town centre. The planner's ultimate aim is to create pleasant and convenient living conditions for as many of the townspeople as possible, and we suggest that he should beware of accepting dogma that may prevent his candid examination of their needs and desires. But whatever the density structure in our large towns may become it is very probable that the range between the density of the most compact inner areas and the density of the areas on the fringes will be reduced. This reduction is likely to take place partly because, on the basis of standards discussed earlier, areas near the town centre will be found to be overcrowded, and partly because some increase may be found necessary in the densities that have hitherto been considered appropriate for peripheral development.

5 *Residential Density and Cost of Development*

We would now like to turn to the relationship between density and cost of development.

The relative importance of the main use groups occurring in towns may be seen to some extent from the following figures. The figures are averages, expressed in acres per 1,000 persons, for each of six land use groups previously described, and have been obtained from a sample of existing towns.

USE GROUP	AVERAGE ACREAGE PER 1,000 POPULATION FOR TEN TOWNS OF SAMPLE
Residential Areas .	39.0
Central Areas .	1.9
Industrial Areas .	9.2
Higher Education (i.e. Secondary Schools and upwards) . .	2.4
Open Lands . .	12.0
Large Establishments . .	4.0

These figures are taken from a small sample, and though they are probably a fair guide to the state of affairs as regards relative importance of land uses in other towns, they should be taken with reserve, and of course have no significance as standards.

The real task which Development Plans for towns are designed to discharge is to set the lines for long-term urban rehabilitation. Nearly all our towns show six main defects—congestion of space and building uses at the centre, congestion of traffic including the passage of heavy motor traffic along unsuitable roads, areas of mixed uses (particularly of industry mixed with dwellings) which urgently require sorting out, large areas of obsolete and overcrowded dwellings, insufficient open space, and inadequate schools (particularly in respect of playing fields). Development Plans are the medium by which local planning authorities are expected to examine their towns for these main defects, and to make a plan for gradually putting them right in stages related to the resources available.

Considering now the effect on the size of the main use groups, it is possible to dismiss two groups as unlikely to be greatly affected. No action resulting from Development Plans is likely to increase very greatly the land occupied by central areas and large establishments. Nor will the gradual carrying through of measures for the relief of traffic congestion require very much land in relation to the whole town area. On the other hand, the rehabilitation of obsolete residential areas and the reduction of overcrowding, the reorganisation of industrial areas including the extrication of industries from areas of mixed use, the provision of more open space, and the reconstruction of schools, including the provision of new ones, are all changes that may well require considerable areas of land. With the sole exception of schools, however, for which statutory standards have been prescribed, it is extremely difficult to be specific about the effect which these changes may have. This is due partly to the great variety in the size of land use areas which existing towns display, and partly to the wide range of suitable standards likely to be adopted in Development Plans. An idea of the relative importance of the main land uses in a town of 50,000 people as they might be after redevelopment to certain standards is given in *Figure* 3 (p. 332).

Typical areas required for the main components have been plotted vertically above one another. A fixed standard of 100 acres for the central area, and of 50 acres for large establishments, has been assumed; educational land is to full Ministry of Education standards; and other uses are to reasonably generous standards until the gross residential density increases to 45 persons per acre at which figure the overall town density would be about 20 persons per acre. When overall density exceeds 20 persons per acre it will be seen from the graph that even to prevent the average gross density exceeding a figure as high as 60 persons per acre a marked reduction in standards for non-residential components would be necessary. These reductions are not shown in detail on the graph, because, whenever they become necessary it would obviously be a matter of choice which land uses should be cut out and by how much. A gross residential density of 60 persons per acre mentioned in the previous paragraph is a high figure. Reference to *Figure* 2 will show that given a reasonable open space standard (though not as high as 7 acres per 1,000), a gross density of 60 persons per acre would result in an average net density of 120 rooms per acre and this would inevitably mean that a high proportion of people would be accommodated in flats.

The savings in land that might be achieved by altering the standards of any of the main uses depend, of course, upon how big a part any component use is of the whole. It is clear from *Figure* 3 that by far the largest component is the gross residential area, and it is this that is most likely to yield a substantial saving by alteration of standards. The open land component is also a major user, but it is fairly plain from the figure that the other groups are unlikely to provide a source of spectacular saving.

If it be granted that up to 25 per cent. of the accommodation might be in some cases appropriately placed in flats, then it would appear that net densities up to about 80-90 rooms per acre might well be possible. This does in fact correspond with the advice given in the Ministry of Health Housing Manual (paragraph 26) that a full range of schools and communal facilities can be provided at gross densities ranging between 30-40 persons per acre, for the corresponding net densities range from 50 to 80 rooms per acre. The place where savings of land might be achieved by using these gross densities would of course be in large peripheral estates. As far as we can see many of these estates are now being developed at gross densities as low as 20 persons per acre, and we suggest that this is really too low. We suggest that gross densities of 30-40 persons per acre are quite practicable given a freer use of terrace houses and low flats, and that by this means savings of land of perhaps 25 per cent. could be obtained in large scale peripheral development. We think higher net densities might even result in a saving of land compared with *inter-war* development, in spite of the increased standards now in use for schools, open spaces and other uses.

We think it improbable, on the other hand, that a total saving of as much as 25 per cent. in respect of peripheral development could be achieved over the whole country. Large estates will

be the exception rather than the rule, and the smaller and more scattered the reception sites are for overspill, the less will be the chances of making effective savings. In many rural and small town areas, moreover, development will be appropriate at comparatively low net densities allowing for houses with fairly substantial gardens.

We feel we should mention the other broad alternative approach to the saving of land, that is to say to redevelop at densities which would not involve, or at any rate substantially reduce, overspill of population. Most of the proposals we have seen for redevelopment in the large towns are by no means at low densities, the net figures range from 100 to 140 rooms per acre and sometimes higher. These may be low in comparison with some American schemes which run up to 300-400 rooms per acre, but they necessitate much of the accommodation being in medium or tall flats and so are high by our ideas. So the real question is whether these densities of 100 to 140 rooms per acre could be pitched still higher in order to avoid overspill.

We have no doubt that net densities could be substantially increased provided that a fully flatted existence for everyone is acceptable as a housing policy. This would save land. On the other hand the net housing area is only part of the total land needed in a residential area, and the higher the net density the more important do such uses as open space become. Doubling a net density by no means halves the total land required for the whole residential area. Land could be saved by adopting a redevelopment density of say 200 rooms per acre instead of 120, but the saving would not be as much as many people might think at first glance, and we very much doubt whether the resulting housing conditions would be generally acceptable. In short, we doubt whether much can be done to increase redevelopment densities where these are already proposed to be of the order of 100-140 rooms per acre. What we are unconvinced about are the very low peripheral densities now being adopted; we feel there are unexplored possibilities of mixed development (houses and flats) in the range of 60-100 rooms per acre net, and that these might well result in more compact and more livable residential areas than those of more open layout.

We have suggested that more low flats might be built. This brings us to the relative cost of houses and flats and the relation to density. The remarks that follow are purely exploratory and lead only to the most tentative conclusions.

The first need is to have some idea of the relative cost of housing in the semi-detached, terrace and flat forms. The following figures show the approximate relative costs of building a dwelling of fixed size in various forms of structure.

These factors relate *to the basic cost of the structure only*, which has been taken as the fairest basic unit for comparison. In practice, the cost of lifts, laundries, playrooms, etc., and other items normally associated with flats, but yet too variable to be included in a basic cost factor, would tend to increase the factors for flats possibly in some instances raising the factor for high flats to as much as 2.5.

TYPE OF STRUCTURE	COST FACTOR
Houses, semi-detached .	1.0
Houses, terrace, 2-storey	1.0
Houses, terrace, 3-storey	1.1
Flats, 3-storey . .	1.2
Flats, 5/6-storey, with load bearing walls .	1.4
Flats, 6/10-storey, with framed structure .	1.6

On the basis of the cost factors given above a diagram has been constructed (*Figure* 4) to illustrate the *kind* of relationship that exists between net density and cost of development. The curves are based on a series of assumptions sufficiently accurate to portray the general trend. They are not based on measured results. In this diagram there have been plotted vertically, for various net densities, first the cost of roads, services, and site preparation per habitable room, then the cost of structure per room, and then various costs of land per room. The tentative lessons of this diagram and of the table seem to be:

(i) Total cost-per-room decreases, irrespective of land cost, with increase of density until it becomes necessary to start using flats. The increased cost of structure then causes the total cost-per-room to rise sharply. At still higher densities it starts to fall again, but where land costs less than about £32,500 per acre the cost-per-room does not recover sufficiently to drop below the first minimum, even if the density is increased to 200 rooms per acre. Where land costs over £32,500 per acre it pays to increase the density. In brief, high densities only pay, in the narrow sense, when land is very expensive, though this is not to say that the costof high density in other circumstances may not on occasion be justified.

(ii) Where land is cheap, two-storey open-type development is likely to continue to be more attractive, financially, than high density development.

(iii) There are grounds for contending that a modest increase of density compared with current and inter-war practice, involving a freer use of terrace houses and low flats, would not cost a great deal more. This contention does not appear out of harmony with our earlier remarks about household structure and dwelling distribution, which broadly indicated that 20 per cent. or so of the accommodation for a representative group of people might reasonably be in the form of flats. If any figure of net density can be said to have a particular significance, we think it may be 90 habitable rooms per acre, for not only is this about the maximum density at which houses and flats can be built at an 80%-20% ratio, but above this density the cost per habitable room is likely to rise.

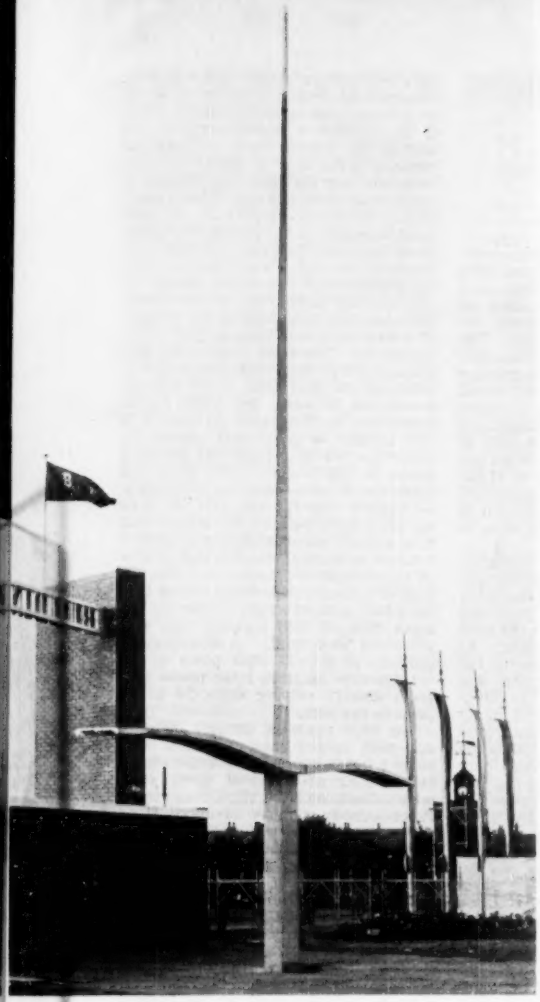
Before leaving the subject of density and cost of development, we ought to say a word about the total price that may have to be paid in the future, in terms of land loss, to meet all our problems of urban redevelopment.

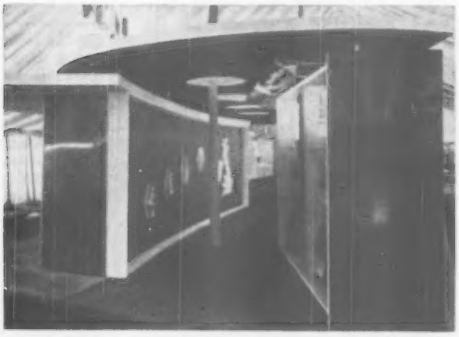
It is not at all easy to estimate how much land every town and every village is likely to need in the future for all purposes. One approach to this question was made by Professor Dudley Stamp in his paper to the Town Planning Institute on February 2 this year. The method in essence was to work out an average housing density and to apply it to alternative assumptions of the number of people likely to need rehousing in the next 20 years. His first postulate was that half the population might need rehousing at a "New Town" density of ten persons per acre. We have little hesitation in saying that the conditions are never likely to be fulfilled; we know of no plans for rehousing half the population at New Town Standards. We take the same view of the second postulate that one-third of the population may need rehousing at New Town standards. The third suggestion, that one-quarter of the population might be rehoused on new land at an average density of 53 acres per 1,000 people (equivalent to 19 persons per acre) is in our opinion a good deal nearer the mark but we still think the resulting figure of 583,000 acres is too high. We agree that if house building proceeds at its present rate for the next 20 years we shall have built at the end of that time enough accommodation (4 million houses) to contain roughly one-quarter of the present population and that the bulk of serious obsolescence will by then have been cleared away, but we do not agree that all this building will take place on new land. A considerable amount of it will take place in redevelopment areas in large towns at a gross density varying from 50 to 70 persons per acre.

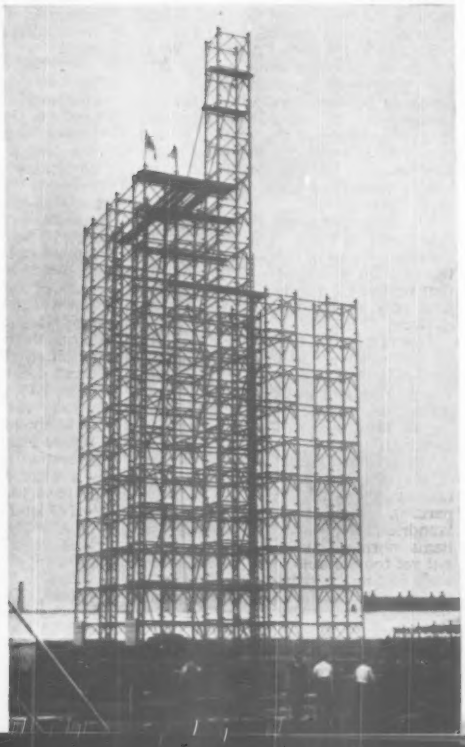
We have made an entirely different approach to the same problem. We sought out a representative sample of towns (i.e., urban local government areas) where we knew the Development Plans were in a fairly advanced stage of preparation and with the help of the local planning authorities we measured the land needs for the next 20 years. We actually took 46 towns with populations varying from a few thousand up to half a million and having a total population of nearly 5 million, forming about 19 per cent. of all towns. We then worked out average rates of land requirements per thousand persons and with suitable precautions we applied these to the population of all the towns in the country. We did a somewhat similar analysis for all the rural areas, working from a sample of 19 rural districts having a total population of 315,000. We made a separate estimate for London. Our gross total for England and Wales worked out to 490,000 acres required in the next 20 years. We realise fully the chancy nature of our estimate but we doubt whether a better one will be made until the Development Plans for the whole country are available.

Not all this land, which will be needed, will be agricultural. We think that perhaps 95 per cent. might be in this class. Taken as a percentage of the total area under crops and grass (say 24 million acres) the estimate of loss amounts to just under 2 per cent. It is not within our province to say how serious this loss would be to agriculture. We can only say that it looks as though something of this order will be needed for remedying the bad urban conditions that are only too evident in every town. It will in any case be a gradual loss and the five-yearly revisions of Development Plans will provide the opportunity to watch the trend and if necessary to adjust policy.

BUILDING WEEK LEEDS







1. *The 51 ft. concrete mast post-stressed by the Lee-McCall system was cast in 3' 0" sections and assembled and stressed on the ground. The cantilever wings, 17' 0" clear span × 2' 0" wide were also cast in short lengths, laid on scaffolding and post-tensioned from both tips.* **2, 3** *and* **4** *are M.o.W. stands designed by Bryant and Pearce, A.A.R.I.B.A.* **5.** *The giant scaffold tower erected by Kwikform Ltd., with the firm's patent units.*

NEWS of the BUILDING INDUSTRY

The Minister of Works, Mr. Richard Stokes, opened the exhibition at Hunslet Moor on September 11th. Owing to the dispute in the printing industry, the first report from Charles Crichton was held over until this week. His first impressions are given on this page.

THE first day of the Ministry of Works Building Week at Hunslet Moor, Leeds, was one of intermittent heavy showers—an unfortunate start for the numerous outdoor exhibitors.

However, the tented part of the exhibition provided shelter and therefore, possibly, an unfair advantage to those firms whose stands were under cover. All of which goes to show that, for exhibitions of this kind, the existence of a permanent building large enough to contain undercover all the exhibits—large and small—is most desirable.

These notes are impressions gathered from the first day activities which ended with a lecture by members of the American Productivity Team, followed by a discussion and questions.

Opening the exhibition in the afternoon, the Minister of Works had drawn attention to the importance of incentives and stressed the value of machinery in speeding up production. Mechanization and organization were, in fact, the keynote of the exhibition. But it was apparent, from the trend of questions after the evening meeting, that these two factors are secondary to the political angle in the minds of many of the visitors.

The success of the effort by the Ministry of Works in conjunction with the professions and building trade to demonstrate—in these building weeks—that the necessary organization and plant is available, depends largely, it would seem, on the attitude of mind of visitors. There is still much prejudice to be overcome. There is, too, the deadening effect of the present international situation. Money is tight. And many machines when assessed at initial cost value are expensive.

But there seems to be an even more important obstacle than these to overcome before the true purpose of these building weeks can be realized. It is not enough to show the goods and announce that the Government, the professions and industry have collaborated. Collaboration may be, indeed certainly is, the intention of all concerned. But it is very apparent that in some cases this collaboration is, as yet, only skin deep. For example, it must have been clear to most of the audience at the Productivity Team meeting that the viewpoints of members of "the team" were not in harmony. Politics appear to control the situation and the cynic may be excused if he says in despair, "What the Hunslet Moor ?"

In reality, of course, it is not politics but conditions which control the situation. And if anything was made really clear at the evening discussion it was that organization, mechanization, incentives, full employment, production and the rest are all dependent on the supply of materials. Given this supply, it could be proved to the operative, who is scared of mechanization as a possible creator of unemployment, that his fears are without foundation. Given the materials, the employer could show his men that one job on incentives would lead to another. Given the materials, the architects' time would not be wasted at the expense of pre-planning time. In fact, given the materials, the parts of the picture puzzle would all fall into shape. But whatever one's political complexion it is not reasonable to blame the shortages on to politics.

The first job of the Ministry would therefore appear to be to explain to the numerous visitors who still cannot grasp the facts, in far greater detail and in very simple language and without keeping anything back, just what the shortages are and why they are.

When this has sunk in then the true value of these exhibitions may begin to be appreciated and acted upon with resulting increase in production and more money with which to buy the materials that are needed.

It is of little value for the R.I.B.A. to show pictures of Harlow or for manufacturers to demonstrate plant until it can be shown that the materials for all the necessary Harlows can be more quickly and efficiently converted into buildings by the use of machinery and without loss of employment to the operative.

The problem can be further resolved into one of leadership and the onus in this direction rests on—because it cannot be rested from—the Minister of Works. As things are, the architect, the employer and the operative are not and cannot be, in a position to lead.

Apart from generalities, however, and within the confining limits of the above opinions and the weather, this particular Building Week is an advance on previous exhibitions of the kind.

The manufacturers are to be congratulated on the array of exhibits. Amongst which there were several of news as compared with proved value.

Noticed were a new asbestos sheet or slate cutter with a movable knife operating down a central metal groove. The knife blade is smooth, hollow ground, requires no resetting. The knife makes cuts of 1 ft 9 in, and since the knife movement is controlled by the design of the groove there is no necessity to move the sheet.

A tractor mounted concrete mixer with a 3½ cu. ft. (mixed) capacity and priced at £73 10s. ex works, has a normal feeding height of 3 ft 6 in, and a lowest discharge height of 2 ft. The mixer unit is clamped to the back of the tractor and is driven by telescopic shaft from tractor and thence by multiple vee-belt to bevelled pinion shaft.

Shown for the first time in this country was a boltless system of scaffolding which has been used on the continent for many years. The principal feature of this scaffolding is the coupler unit which is secured by metal wedges in place of screwed bolts.

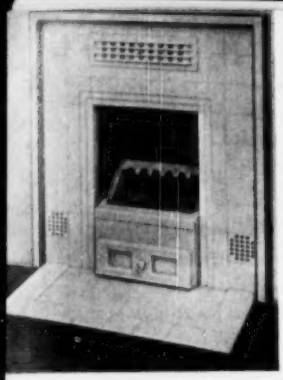
A new development in inflatable tubes for preforming holes in concrete work is just about to be marketed in the form a 4-in tube—the largest yet made.

Details of these items will be sent to readers on request.

Architecturally, the chief interest lay in the entrance feature designed by Bryant and Pearce, A/A.R.I.B.A. and in the Ministry of Works stands designed by the same architects.

In the open air section a scaffolding tower feature dominated the exhibition.

By night the entrance courtyard was effectively floodlit.



MOSAICS A4/5
STRUCTURE FIREPLACES

Designed this year as a surround to the special grate illustrated this fireplace incorporates perforated tiles as inlet grilles and louvred warm air outlet grating. Dimensions are 36" wide × 40" high × 18", hearth projection and the tiles are 4" × 4". Fire and surround are available for export and home market.

MOSAICS B3/3
SERVICES HEATING

The independent boiler unit, shown here combined with a cooking unit, is for water heating and space heating. Dimensions are 21" wide × 22" deep × 36" high. The boiler is continuous burning, with special ash container which needs emptying once in 7-14 days. Heating surface is 4·10 sq. ft.: fuel capacity 7ft cu. ft. Hot water supply rating is 45,000 B.T.U's per hour: 45 gallons per hour at 150°. Finish is hard-baked enamel. Standard boiler is designed for indirect, 35 gallon cylinder. (45 gallon direct cylinder.)

MOSAICS E7/1
PLANT MOBILE

Designed for loading, carrying, placing (particularly in narrow foundations) and backfilling, this multi-purpose builder's machine has a 7 cu. ft. skip at one end and a dozer at the other. Dimensions are 9' 5" long × 4' 10" wide × 2' 9" high. The petrol engine is an 8 h.p. JAP. Driver's seat is reversible. The machine is capable of pulling a trailer.

MOSAICS E8/1
PLANT
CONCRETE MIXING, ETC.

A new continuous loader in conjunction with a weighbatcher. A delivery of 20 cu. yd. of concrete per hour is claimed for this combination when teamed with the appropriate mixer. Overall height 31' 6": weight 3½ tons. The power unit is a JAP air cooled petrol engine 5·5 h.p. or Diesel or electric. The loader is dismantled for easy transport.

MOSAICS

The names and addresses of manufacturers of any item illustrated in MOSAICS, together with more detailed information relating to their products—including price and availability—will be forwarded to readers on request.

Letters should quote the serial number and be addressed to :

The Associate Editor,
The Architect and Building News,
Dorset House,
Stamford Street, S.E.1.

Please mark the envelope MOSAICS.

* INTEREST *

THE FACTORIES (Examination of Plant) (Revocation) ORDER 1950 which revokes the Factories (Examination of Plant) Emergency Order 1941 takes effect from October 1st, 1951.

*

ADPRINT LTD. announce that they have been appointed sole contractors for the sale of advertising space in all Festival of Britain official publications carrying advertisements. Final press date for the catalogues is November 30th.

*

A. W. HAWKSLEY, a branch of the Hawker Siddeley group, is negotiating to supply 10,000 factory-built houses a year to Australia.

*

THE IDEA that small establishments are likely to have lower Labour Turnover Rates because of the more personal relationship possible between management and workers in small firms is refuted in the second British Institute of Management Labour Turnover Analysis for July-Dec. 1949 recently issued. It shows that the Labour Turnover Rate decreases as the size of the establishment increases.

A high proportion of all male leavers resigns for Works Reasons. While resignations may not be "unavoidable" or the fault of management, it is felt that resignations for these reasons provide management with a possible field for investigation and action.

*

FILM ON THE KILN-DRYING OF TIMBER was shown for the first time to students attending the Timber Trade's annual summer school at Cambridge University. Taken by Mr. David B. Irvin, Chairman of the Education Committee of the Timber Development Association and a prominent member of the Liverpool timber trade, the film shows in detail the equipment of a kiln, and goes on to demonstrate the correct method of stacking the timber, the periodic testing of sample boards for moisture content and the regulation of humidity and temperature inside the kiln.

Particular emphasis is laid on the importance of a meticulous vertical alignment of the sticks separating the boards in a pile, in order to avoid distortion.

INTEREST *continued*

IN AN ENDEAVOUR TO FIND an economical alternative to district heating for future housing schemes, James Black, heating and sanitary engineer, of Kirkcaldy, has developed a system which is said to give comparable results from traditional construction. The following experiment was carried out on a semi-detached, two-storey, traditional type, five-apartment house.

At the back of the normal fireplace in the living room a two-piece angle-shaped copper boiler was inserted. One section was connected to the hot water supply system, the other section had a flow and return of copper tubing running direct to the attic. The flow connects with the return in the attic space where an expansion pipe branches off to discharge above a small supply cistern which incidentally is connected to the return pipe and trapped. The whole heating system only contains 6½ gallons of water. Connections are made to radiators in each of the bedrooms and to a coil in the bathroom. Both sections of the boiler have scour pipes led to the outside of the building, and there are two dampers. For simplicity of operation, there are no valves.

The installation was tested on four separate days with measured quantities of solid fuel. Temperatures were taken at hourly intervals over a 12-hour period each day with windows closed. Despite adverse conditions, it was possible to maintain living-room temperatures between 58 to 64 deg on the first three days.

The fourth day, using good fuel and with the floor tiling completed, the living-room temperature was kept all day at 64 to 68 deg, while the bedrooms were kept at 57 to 62 deg.

The total amount of fuel used for this test was 27 lb of coal and 1 lb dross, for the 12-hour period, a further 7 lb being required for banking up overnight (total 35 lb per day or 2 cwt per week). While this is more than the present household coal ration, it is not anticipated that these temperatures will require to be maintained day and night.

It has been estimated by an established firm of quantity surveyors that the capital cost on the basis of installation in a housing scheme, containing a reasonable number of houses, would be £40 to £50 per house.

•

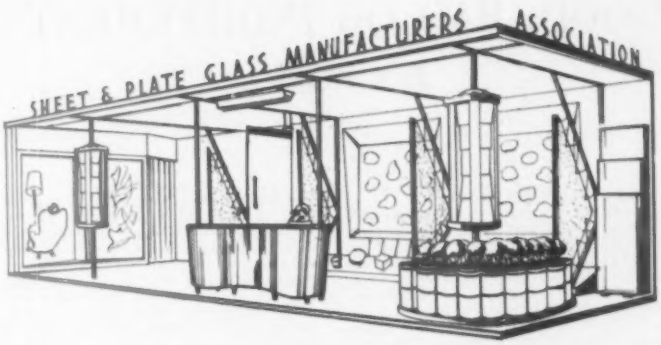
THE INTERNATIONAL SCIENTIFIC FILM ASSOCIATION'S fourth congress is to be held in Florence from October 14th-22nd, 1950. A special committee of the association has been set up to recommend films for submission to the film festival at the congress. The committee will welcome information about recent films. Full details should include running time, gauge, production date. Producers are asked to indicate whether they will provide copies for viewing as soon as possible.

•

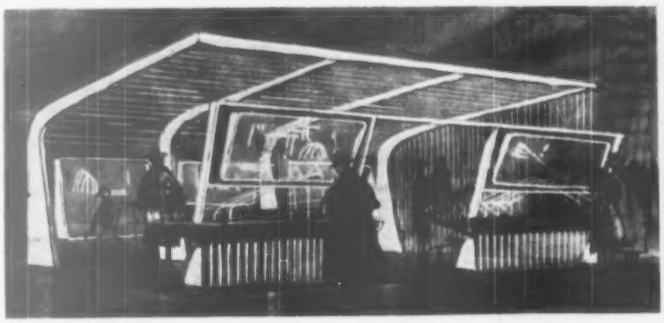
M.O.W. REGIONAL DIRECTOR, Mr. E. Hughes-Jones, moves from the North Midlands area to Bristol on October 1st to succeed retiring Major-General H. B. W. Hughes. Mr. W. T. Lewis succeeds Mr. Hughes-Jones as North Midlands Regional Director.

•

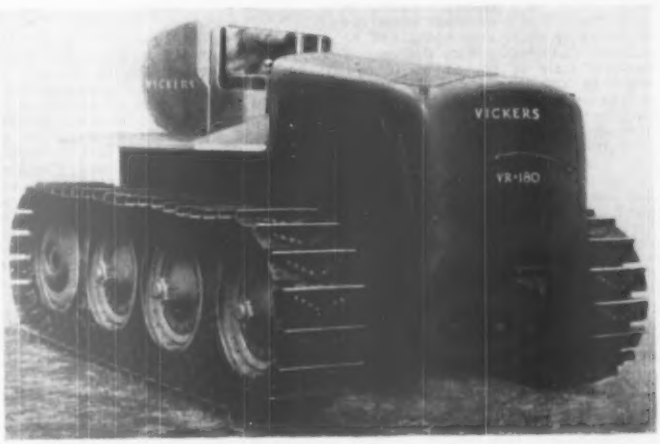
ASCOT GAS WATER HEATERS LTD. have obtained the American Gas Association's certificate of approval for type 701 multi-point gas water heater, thus opening up a hitherto closed export market in North America.



The Sheet and Plate Glass Manufacturers Association stand at Leeds Building Week designed by Sven M. Sternfeldt.



The Timber Development Association stand at the Leeds Building Week Exhibition designed by J. R. M. Poole, A.R.I.B.A.



Specification of the new Vickers tractor—VR180—has now been released. The tractor, for which sole distributors are Jack Olding & Co., Ltd., is 14' 8" long × 8' 8" wide × 7' 3" high and weighs 32,500 lb—about 14½ tons. It has six forward gears from 2·18 m.p.h. to 9·73 m.p.h. and three reverse gears up to 8·0 m.p.h. The Rolls-Royce 6-cylinder Diesel engine gives an approximate draw-bar horse-power of 150. Steering is by two levers which operate both the hydraulic clutch release and the steering brakes. Height of draw-bar above ground is 16", lateral movement 35½". Power take-off points for winches and hydraluic equipment are incorporated.

GOOD, BAD OR INDIFFERENT?

By A. FOREMAN

No. 9

TANKS AND CYLINDERS

I often see hot water storage tanks and cylinders which have been badly selected and badly fitted. A little attention to detail can easily make a great difference to the efficiency of water systems as a whole. Water in a tank or cylinder settles in layers with the hottest at the top, so it is better to make this area the smaller cross-section of the container, thus hot water accumulates more quickly and the cold entering at the bottom is less inclined to be forced up to mix with the hot. If water is drawn off at the top the hottest is first available. The use of cube- or flat-shaped tanks instead of rectangular ones fixed with the greatest dimension vertical, or cylinders laid on their sides instead of being used with their longest dimension vertically are very common faults; these may often be more convenient from the point of view of the space occupied by the container but involve a considerable loss of efficiency.

It must be remembered that only a small amount of water is heated during the time other water is being drawn off, so the amount of hot water storage and therefore the size of the container has a great influence on both the quick and the adequate availability of hot water. When a small independent boiler is used as the means of heating, the storage tank or cylinder should have an *actual* capacity of about 35 gallons. Storage containers are often sold by the nominal capacity (it sounds more !) which is very different from the actual capacity, but it is the latter which interests the user. Thirty-five gallons are needed to provide two or three gallons for the kitchen or hand-washing and two baths with half an hour between them. Baths need about 25 gallons of water at 110° F. and hot water should not be heated to more than about 150° F., especially in hard-water districts, if excessive scale is not to be formed. Therefore less than about 35 gallons storage is unsatisfactory in most houses however small, and if baths are wanted more frequently or in greater numbers, more storage must be provided together with a larger boiler. This amount of storage may be provided by using a B.S. size 2·6 (B.S. 417) galvanized steel tank which is 27 in high by 20 in by 20 in; it has an actual capacity of 34 gallons, although the nominal size is 40 gallon. If a galvanized cylinder is required, use B.S. 417 size 3·4 which has a height of 42 in, a diameter of 18 in and an actual capacity of 36 gallons (nominal capacity 39 gal.). A copper cylinder of the same dimensions is size 4 of B.S. 699 having an actual capacity of 34 gallons.

If the means of heating is to be a back-boiler to a room fire or a cooker, the storage container may have to be a little smaller. This means using a B.S. 417, size 2·5, galvanized tank, actual capacity 29 gallons, a B.S. 417 size 3·3 galvanized cylinder, actual capacity 30 gallons, or a copper cylinder B.S. 699 size 3, actual capacity 29 gallons.

Do not forget to order the right grade of tank or cylinder to suit the water pressure in each installation. Galvanized tanks are made in two grades, Grade A is suitable for a maximum working head of 15 ft of water from the bottom of the storage container to the water level in the cold storage cistern. Grade B is only suitable for 10 ft of working head of water. Cylinders whether of galvanized steel or of copper are made in three grades: grade 1 for 100 ft, grade 2 for 60 ft and grade 3 for 30 ft working head of water.

Using the greatest dimension of the storage container vertically as suggested above does, I know, cut badly into the linen cupboard, or any other space, but better hot water and the ability to draw small quantities very quickly after starting to heat is well worth the space lost: it is probably even more important if an electric immersion heater or a gas circulator is installed for summer heating.

Storage containers should be as near the boiler as possible to reduce to a minimum the length of primary flow and return pipes. It is, of course, best to put the storage in the linen cupboard as this needs some heat, but there will still be plenty even when the container is well lagged. On all systems, whether direct or indirect, storage containers should have a hand-hole at least 6 in in diameter for internal access.

It is important before installing a storage container to see that they are marked as having been tested at the maker's works *before* delivery. Although thicknesses of metal may be specified, as in the British Standards, containers may fail, with disastrous results, due to a defect in manufacture which may not be found until the system is operated.

It is also wise to have a good look at the galvanizing to see that all the surfaces are covered properly: for similar reasons it is wise to order the containers with the necessary inlet and outlet holes cut before galvanizing and also to have provision made for a screwed connection for an immersion heater as these preparations save damaging the galvanizing by cutting on the job. The positions for these holes as set out in the British Standards are the best to secure efficient working of the system as a whole. By the way, it is unwise to fit an immersion heater in a system with a secondary circulation as the heat loss will be too great.

When installing tanks and cylinders remember to put the hand-holes where they can be got at without pulling the enclosing cupboard to pieces and also allow 3 in between the container and surrounding walls in every direction for lagging and circulation of air and also for working space. Remember also that full containers weigh quite a lot and need proper support such as two pieces of timber to spread the weight over several joists.

DOMESTIC ELECTRIC WIRING—No. 4

Some Modern Tendencies

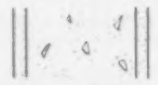
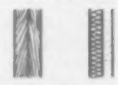
By T. C. Gilbert, M.I.E.E.

(4) *The General Picture*

From the three foregoing articles it will be seen that the modern tendency is towards reinforcement of insulation, which in turn postulates the elimination of as much metalwork from the wiring installation and its associated equipment as possible. For many years past, the Wiring Regulations of the Institution of Electrical Engineers have strongly advocated the use of apparatus of the all-insulated type wherever possible, as opposed to that having exposed and handleable metalwork, whilst the industry has recognized the illogicality of enclosing electrical conductors in metal sheathings or conduits, with the earthing of such metal as a protection against leakage, and which in its turn is often a factor in setting up the leakage it is designed to remedy.

Prior to the war, however, there was a lack of suitable materials to enable this desired objective to be reached, but the spectacular development of plastics, especially the synthetic resins and polythene, has removed the last obstacle. The change-over is therefore being brought about, not only for the reasons set out in the foregoing articles, but for many others. One of these is the ever-increasing loading of domestic installations, with the result that to-day even small prefabricated houses may have demands in the neighbourhood of 12 or even 15 kW. This has repercussions on leakage protective problems, and in the main has served to show the inadequacy of some hitherto generally accepted methods, of which earthing is the chief.

In the early days of steel conduits for electrical installations, it was considered that this system must have considerable advantages over the hitherto universal wood casing and capping from the fire risk angle, and when domestic loadings were small this was the case. An entirely different picture is presented to-day, however, as it is found that metal sheathing an installation is only safe from fire if the earthing arrangements are practically perfect and, most important, capable of carrying the heaviest fault currents without overheating. For instance, when electricity was used only for lighting, and possibly a few small appliances, main fuses were of 10-A capacity, capable of being blown with an earth fault current of 25 A. To-day, however, with increased loadings for cooking, water heating and refrigeration, to mention only a few uses, main fuses are nearly always of 60-A capacity, with the result that an earth fault current of 150 A is necessary to cause them to melt. Assuming that the supply voltage is constant at 230 V, then the resistance of the earthing path with a 10-A fuse could be found from the following simple formula: resistance = supply voltage

MATERIAL OF WALL	WEIGHT OF WALL IN POUNDS PER SQUARE FOOT	APPROXIMATE SOUND REDUCTION IN DECIBELS	SOUND ABSORBTION CO-EFFICIENT OF INTERNAL SURFACE AT 500 C.P.S.	'U' VALUE IN BRITISH THERMAL UNITS PER SQUARE FT. PER HOUR PER °FAHRENHEIT	LINEAR CO-EFFICIENT OF THERMAL EXPANSION WITH RANGE 0° TO 100°C. $\alpha = 0°C$ ($\times 10^{-6}$)	EXPANSION ON IMMERSION OF DRY SPECIMEN IN WATER AS PERCENTAGE OF ORIGINAL LENGTH
4½" brick	50	45	0·02	0·64	5·5	Up to 0·05
9" brick	80 to 100	49	0·02	0·47	5·5	Up to 0·05
9" brick ¾" air space ⅜" plaster-board on battens	80 to 100	50	0·04	0·29	5·5	Up to 0·05
11" cavity wall ¾" plaster Unventilated cavity	80 to100	55	0·02	0·30	5·5	Up to 0·05
11" cavity wall ¾" plaster Ventilated cavity	80 to 100	55	0·02	0·34	5·5	Up to 0·05
4" brick 2" cavity 4" breeze ⅝" plaster	70 to 90	53	0·02	0·27	—	—
4½" concrete	50	45	0·02	0·69	14·3	0·02 to 0·06
4½" concrete ¾" air space ½" fibreboard	50to60	48	0·03	0·26	14·3	0·02 to 0·06
 9" concrete 1" plaster on both sides	Not less than 80	49	0·02	0·22	14·3	0·02 to 0·06
Corrugated asbestos 2" air space 1" insulation ¾" plaster	12	37 to 40	0·02	0·22	—	—
 Two 1" boards 4"X2" studs 1" insulation ¾" plaster	20	40 to 43	0·02	0·18	—	—
Single glazing	1¼	27	0·10	1·00	0·00009	—
Double glazing 6" air space	3	50	0·10	Not less than 0·50	0·00009	—
3⅞" glass brick	15	35	0·01	0·35	0·00009	—
12" stone	136 Portland 165 Granite to 150 Sandstones	51	0·02	0·48 Portland 0·63 Granite 0·43 Sandstone	6·3 Portland 8·6 Granite 11·0 Sandstone	0·01 to 0·07

Supplement to *THE ARCHITECT and Building News*, September 22, 1950

CONSTRUCTION SHEET L.2, C.18.

Editorial Notes

This sheet gives various properties of walling materials used in building.

Column (1) *gives the weight of the walling material in pounds per square foot.*

Column (2) *the approximate sound reduction in decibels. This factor is generally considered only in party or partition walls, but the complete list for all wall structures is given, as there are occasions, when extensions are added to a building so that the external wall becomes a partition wall. If a frequency has a loudness equivalent to an intensity of 70 decibels and is transmitted through a 4½" brick wall, the reduction factor of which is 45 decibels, the noise penetrating through the wall will have a loudness equivalent to an intensity of 70 minus 45, which equals 25 decibels.*

Column (3) *Sound absorption co-efficient of internal surface. These figures are used in calculating the reverberation time, i.e., the interval between the stopping of the source of sound and the moment when the subsequent reverberation dies away to inaudibility (or more specifically, the time taken for sound to decay 60 decibels).*
Sabine's formula is generally used to calculate reverberation time for rooms containing a moderate amount of sound absorption materials.
The formula is

$$t = \frac{V}{A} \times 0.05$$

Where t = *reverberation time in seconds*
V = *Volume in cubic feet.*
A = *Product of the area of absorbent and the co-efficient of absorption in square foot units.*

The total absorbing power of the room is obtained by taking the surface areas of the various materials, multiplying each area by its co-efficient of absorption and adding up the products.

Column (4) *"U" values. The loss of heat or heat leakage through the structural materials of a building, is usually expressed by the symbol "U" which is the thermal transmittance in British Thermal Units per hour, per square foot, per degree temperature difference between the inside and outside faces of the wall.*
The formula used to calculate the loss of heat through a wall is $UA\ (t_1 - t_2)$

Where U = *overall co-efficient of heat transfer.*
A = *area of the wall.*
t_1 = *temperature of air inside the room.*
t_2 = *temperature of outside air.*

Column (5) *Linear co-efficient of thermal expansion. The co-efficient of thermal expansion is a means of expressing the change in length or volume which a material undergoes on being heated. The thermal co-efficients of expansion are obtained by measurement on specimens which are free to move under the effects of variation in temperature. A building, however, is a structure in which the various parts are more or less rigidly held and the materials are not free to move. Consequently, the thermal movements tend to set up stresses within the materials under restraint. It is the magnitude of these stresses which is important, rather than the actual free movements under conditions of no restraint. It is possible to calculate the stresses set up due to retrained thermal movements by the formula*

Stress $\frac{P}{a} = \alpha\ \theta\ E$ *per unit length.*

Where α = *co-efficient of thermal expansion.*
θ = *temperature rise.*
E = *Young's Modulus.*

Column (6) *Expansion on Immersion of Dry Specimen in Water. Figures given for the immersion of a dry specimen in water gives a comparison of the amounts which various materials will expand as a percentage of their original length. In certain cases no figures are given, either because the amounts are negligible, or because the wall structure shown is made up of a number of materials.*

"INSULIGHT"

double-glazing units are

PRE-ASSEMBLED

HERMETICALLY SEALED

AND TESTED READY TO FIX

IN SIZES UP TO 100" x 80"

They give windows these additional advantages:

• Improved thermal insulation • Reduction of draughts
• Reduced chances of condensation • Hermetically sealed

"INSULIGHT" double-glazing units

Send for the leaflet describing all their many advantages and methods of fixing.

Consult the Technical Sales and Service Department at St. Helens, Lancs. or Selwyn House, Cleveland Row, St. James's, S.W.1. Telephones: St. Helens 4001; Whitehall 5672-6.

Supplies are available through the usual trade channels. "INSULIGHT" is the British registered trade mark of Pilkington Brothers Limited.

PILKINGTON BROTHERS LIMITED

Typical Heavy Duty Installations by

Jackson

(No. 2)

The Works Canteen Kitchen at International Combustion Limited

This modern Jackson equipment installed in the kitchen at International Combustion Ltd., Derby, caters for 600/800 people. The total loading is 116.5 kW. This illustration shows a Jackson 8-plate Boiling Table, four No. 7 Ovens, a No. 15 Roasting Oven in addition to other equipment. It is a first-class example of the planning and equipping of a modern canteen kitchen.

Jackson

BOILING PANS · BAINS MARIE
CHEFS' RANGES · GRILLS · HOT
CUPBOARDS · STEAMING OVENS
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HARDWEARING

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LIMMER & TRINIDAD

LAKE ASPHALT CO. LTD.

STEEL HOUSE, TOTHILL ST., WESTMINSTER, LONDON, S.W.1

TELEPHONE: WHITEHALL 6776

fault current, or 9·2 ohms ; with a 60-A fuse the permissible resistance must not exceed 1·5 ohms, a vast difference.

Not only is it being found difficult to maintain such low resistances, but ordinary earthing circuits seem quite incapable of safely carrying fault currents of the nature 100-150 A without risk of fire. Cases crop up all over the place of fire and shock caused by failure at some point of the " protective " earthing arrangements. In a recently reported spectacular case, fires and/or shocks occurred in 37 of the 133 prefabricated houses examined. The official view expressed at the time was that the probability of similar happenings existed in a great many more. All the time that metal enclosures are used they *must* be earthed, and all the time that loadings to domestic premises remain as now, or even increase, the earthing arrangements must be suspect.

Here, therefore, is another and powerful argument for the elimination of metal-clad wiring systems for such premises, and the tendency is emphasized with the recent publication of the 12th Edition of the Wiring Regulations of the Institution of Electrical Engineers. According to this, the earthing of certain types of metal-clad appliances may be omitted, if it can be shown that they are *adequately insulated*. This is so important an innovation that the clause should be quoted in full, and it is found in Regulation 1001 (B), as follows :

" *Exemption.*—Except in premises subject to the Factories Act, metalwork of any portable appliance having double insulation (see Definition), provided that the appliance conforms with the safety requirements of a British Standard which has been approved for the purpose of this Regulation."

At the time of writing, one such British Standard has been prepared—No. 1465, for domestic vacuum cleaners.

The Definition referred to need not be quoted here, but it states in effect that when metal-clad appliances have their insulation reinforced, in accordance with specific requirements of a British Standard, then they need not be earthed. With the actual wiring system and all equipment associated therewith constructed in such a manner that their insulation is double, or reinforced, it may be possible in the near future to get rid of the earthing bugbear for ever. However, that day is not yet, but the first step, the use of insulated wiring systems, can be taken now, as installations made to-day will be in use in 25 years' time.

It should be emphasized that the comments and suggestions made in these articles are concerned with the small domestic installation, and do not necessarily apply to the industrial, farm, or large public building installations. It is in connection with housing installations that speed, economy and technical progress are most necessary just now, and any methods that can contribute to these desirable objectives should receive the fullest consideration from those charged with the preparation of specifications for electrical installations. The time has come when the development of plastic materials suitable for adoption by the electrical industry indicates the direction in which such progress is most likely. It will not be claimed that wiring systems, cables, accessories and equipment utilizing plastic material are yet perfect, but they have advantages not hitherto available.

INTEREST *continued*

FESTIVAL OF BRITAIN list of contractors, sub-contractors and suppliers printed in our issue of September 1st should have the following additions :—

In addition to supplying cement for the constructional work at the Festival of Britain, The Cement Marketing Company's Blue Circle products are being used for decorating many of the buildings. For example, the Character and Design Building, Underground Station, Waterloo Road Entrance, Schools, etc., and the Press Room and Press Gallery are being treated with Cullamix Tyrolean Finish, whilst Snowcem will be used for decorating much of the concrete work.

Messrs. Pryke & Palmer Ltd. supplied sanitary goods to Zones 2, 4, 8, 11, 12A, 12B and 13 in addition to Zone 17.

Messrs. Troughton & Young Ltd. carried out electrical work for Zones 1 to 13 in addition to Zone 20.

*

THE DIVISION of The Cementation Co., Ltd., formerly known as the Thermacoust Department has for some time past been a limited company trading under the name of Thermacoust Limited. They are the manufacturers of wood wool building slabs and channel reinforced roofing slabs.

*

MESSRS. TARMAC announce that they have closed their Manchester sales office and have opened a new sales office at State Insurance Buildings, 14 Dale Street, Liverpool, 2.

*

LECTURES ON REFRACTORIES, their manufacture, properties and uses, will be given at the Northampton Polytechnic, St. John Street, London E.C.1, by L. R. Barrett, B.A., B.Sc., M.S., A.R.I.C., M.Inst.F., on Tuesday evenings at 7 p.m. from October 3rd to December 5th inclusive. The course is organized to provide a detailed survey for technologists engaged in the metallurgical, fuels, carbonizing, glass and chemical industries. It is also suitable for students of metallurgy. Fee for the course is 30s. Admission is by personal application at the Polytechnic office between 10 a.m. and 7 p.m. or by post.

OFFICE BOOKSHELF

Junior Technical Education

Three further volumes have been issued in the "Secondary Technical Building Series," thus extending three subjects to the third-year course. Firstly, "**Mathematics III,**" by W. Morgan and J. R. Pickering (Pitman, 6s. 6d.) takes students through simple duodecimals, quadratic equations, graphs and trigonometry and is followed by the mensuration of various shapes and irregular areas. A further chapter deals in simple terms with the slide rule and its use. The matter is as concise as is possible to cover a large field in a way that third-year students can absorb. The book is well illustrated with figures and examples. The second volume is "**Geometry III,**" by G. A. Hanby (Pitman, 7s. 6d.) and presents its material in an interesting way by the combination of essential knowledge with application in building crafts. The third volume is "**Building Science III,**" by S. C. Gibbins (Pitman, 8s. 6d.). Here is building science in its simplest and most elementary form. A wide range of subjects from simple materials to heat, sound and electricity are covered, some very briefly, in thirteen chapters. One wonders, however, whether some of the experiments given are worth making as the experience to be gained from them is so small.

Surveying

"**Principles and Use of Surveying Instruments,**" by J. Clendinning (Blackie, 15s.) is a text book for the more advanced student and is one of two volumes intended to cover the work of the engineer-surveyor. Full and comprehensive information of the range of surveying instruments in normal use is set out together with good detailed descriptions of the methods of their application. It is a useful book on the subject.

Heating and Ventilating

It is a pleasure to see a second edition of Mr. Pallot's "**Principles and Practice of Heating and Ventilating**" (Newnes, 25s.). It has been completely revised and covers really up-to-date information ; the extension of the chapter on ventilating systems is particularly welcome as is also the new chapter on that debatable subject of district heating. It is perhaps a pity that advertising has had to be included but it may be worthwhile if it keeps down the cost of books which are essential to students. The second book on this subject emanates from the same publisher and is "**Textbook of Heating and Ventilating,**" by Holman, Cutler, Sandy and Clark (Newnes, 15s.). It covers the subject less deeply but in a more simple form for the less advanced student. The chapter on arithmetic seems to be misplaced as such elementary knowledge should be acquired before commencing more complex subjects. There is some very useful information on drawings for this particular subject. The third book in this group comes from U.S.A. and is "**Heating, Ventilating and Air-Conditioning,**" by Severns and Fellows (Wiley, New York, and Chapman Hall, London, $6.50). It is very comprehensive and includes a large amount of well-presented detailed information of both theory and practice in America.

Building Science

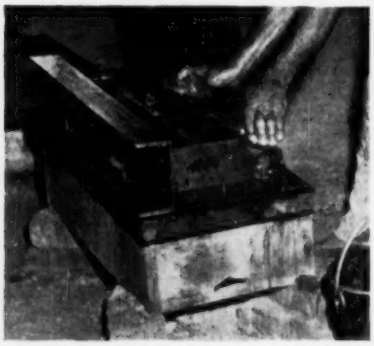
"**Mechanics of Structures,**" by Manson and Drury (Cambridge University Press, 12s. 6d.) is Part 1 of the revision of an earlier book by the same authors. It is Volume II, Part 1, of "Experimental Building Science." The ground covered is the fundamental information without which the study of structural design cannot be commenced. The contents are presented in a clear, simple manner which students of architecture and building, as well as of structural engineering, should have no difficulty in understanding. This book should give an adequate appreciation of the subject. The specialists will no doubt look forward to the publication of Part 2, "Design of Structural Units."

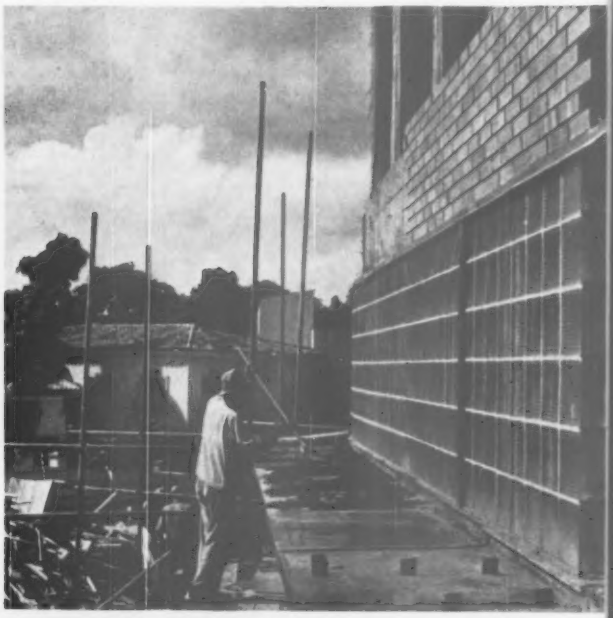
CONSTRUCTION DETAILS

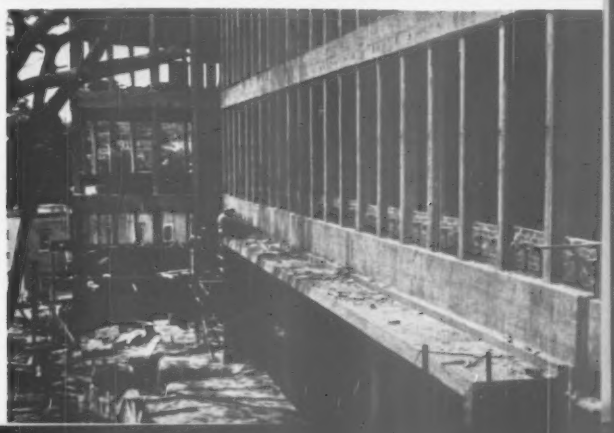
SHELL BUILDING VENEZUELA

The new Shell office building in San Bernardino, Caracas, is one of the few reinforced concrete buildings in Venezuela. Externally the treatment consists of alternating horizontal bands of brickwork, windows and glass brick. Below is one of the steel moulds used for prefabricating the concrete window sills on the site. Right are three views of the construction : bottom, the main entrance hood, showing the step on which the external brick facing will be carried up to the window sills. Sill height is indicated by the top of the inner brick skin ; centre, the glass brick panels above the window head are built up to the underside of the brick bands, the latter are set on the flashing ; top, a finished glass brick panel with brick band above. Note the vertical joint. These occur at every fourth r.c. column.

The construction engineers were Messrs Christiani and Neilsen.







SURFACE FINISHES OF CONCRETE

THE above title is the subject of one of a number of practical courses in concrete work which are organized by the Cement and Concrete Association at Wexham Place (hostel and practical laboratories) and Wexham Springs (research laboratory and testing ground) in Stoke Poges. The object of these courses, which are repeated from time to time, is to promote high standards of concreting practice.

Believing that a little practical knowledge is worth a lot of theory the "Architect and Building News" arranged for Charles Crichton, A.R.I.B.A., associate editor, to attend the two-day course for architects. His impressions and comments are the subject of this article.

The production of good quality concrete which can compare for appearance with other building materials used for facing purposes depends on numerous factors. The design of the mix, the quality of the aggregate, the method of placing and the method of treatment are all vital factors which require craftsmanship and knowledge on the part of the operator and close supervision. In this respect pre-cast concrete is probably more likely to provide the desired standard of finish, because it can be better controlled than *in situ* work. Precast work, however, cannot completely replace *in situ* work and it is therefore essential that all concerned from architect to operator should appreciate the requirements.

The Cement and Concrete Association courses are planned to provide practical knowledge for all who have anything to do with concrete work. Many contractors have already sent their representatives and declared their willingness to let operatives attend. The courses are open, within the limits of the present accommodation, to engineers, architects, local authority representatives, and representatives of manufacturing firms as well as to students. The courses provide a first-rate medium for interchange of viewpoints between designers and men on the job.

It was therefore surprising to find that a course designed for architects was not better attended by the profession.

Two members of the profession who were on this course expressed the view that more architects might attend if the length was reduced from two days to one. This, however, would mean that there would be no chance of following the stages through from making a slab to seeing it finished. For the architect who wants to find out more about surface techniques—however busy he may be—I would say that the two days were worth four spent in reading reports.

At the research station at Wexham Springs, there are now over four hundred samples of pre-cast and *in situ* finishes. The new laboratory building, in course of construction will provide a further "live" exhibit of different concrete treatments. A visit to see these finishes is the preliminary to a series of lectures and practical work which illustrate methods of making up and finishing. Since no amount of clever work at the finishing stage can rectify mistakes in designing the mix, and placing the concrete, the course lays considerable stress on these two important aspects of concrete work.

At all lectures every member of the course is provided with typewritten notes for later digestion. It is not my purpose to reproduce the technicalities of these notes. Suffice it to say that the designer of the mix has to balance the opposing claims of little enough water to prevent excessive pore space and enough to secure workability. Correct water-cement ratio is thus essential for good concrete and it may not be going too far to say that for this reason alone accurate measurement of ingredients by weight and not by volume is an important pre-requisite for a good finish. To obtain this method of measurement in practice is one of the problems for the architect, the engineer, and the contractor who have to "get it across to the operator."

When the water/cement ratio necessary to give the required hardened state has been arrived at it is necessary to appreciate how the characteristics of the materials affect the choice of cement aggregate ratio. There is no single grading which is best for all conditions and it is in this connection that the course is of particular value and interest. For having seen the variety of finished panels, with textures varying from very smooth to very coarse in which a number of aggregates ranging from sand to coarse gravel and brick are used, the nature of the mix, and the methods of finishing are then practically demonstrated.

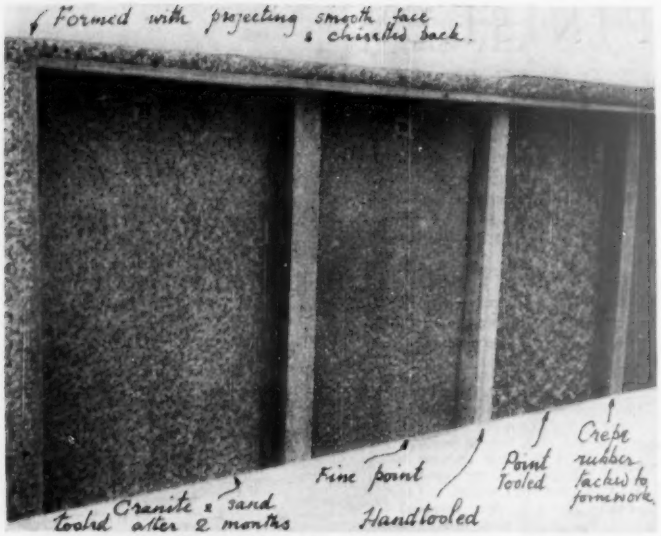
Mr. J. G. Wilson, in charge of the surface finishes course, explaining methods and materials used for obtaining different types of slab.

Finishes may be broadly divided into three categories. First there are those obtained from the formwork or by treatment of the formwork with different types of lining as, for example, crepe rubber.

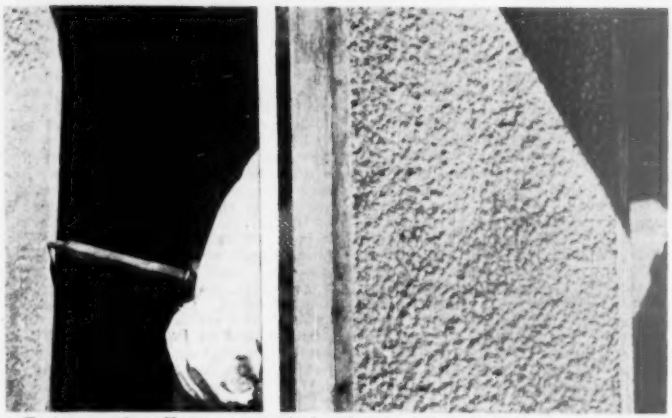
Second, there are the finishes obtained by tooling the hardened concrete; and, thirdly, those obtained by treating the concrete after its initial set but before its final set either by brushing, water-spraying or acid treatment. The last method is, generally, applicable to pre-cast work but results in wide variety of textures and finishes and depends for the effect on whether the slab is made face down or up in the mould.

The picture at the foot of this page shows the result of an experiment on *in situ* work, using methods one and three combined. The soffit was formed up with large gravel aggregate laid on a bed of sand on the shuttering. The concrete backing was then poured on to the top of the large gravel (which must only be laid one stone deep). When

A coarse gravel soffit treatment which gives good texture

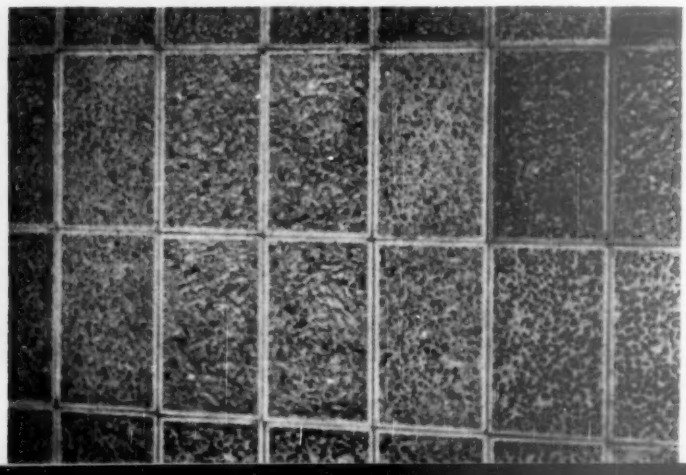

Formed with projecting smooth face & chiselled back.
Granite & sand tooled after 2 months
Fine point
Handtooled
Point Tooled
Crepe rubber backed to formwork

Panels and posts illustrating various finishes for in-situ work



Tooling can be effective particularly when tooled and smooth surfaces are combined. Care is needed when tooling near the smooth face and to ensure that spalling does not occur the edge of the tooled work should be worked with the point parallel to the smooth face.

Below: A panel showing coarse-textured panels of various colours obtained by the use of brick aggregates sprayed or acid treated.



set the shuttering was removed and the sand sprayed off to reveal the textured soffit shown in the picture. This method is used with pre-cast slabs and is a remarkably simple way of obtaining coarse textured finishes.

Brushing or scraping partly set concrete to reveal the aggregate was demonstrated on a number of slabs made up of fine gravel or coarse sand of various types with either white or grey cement. Since colour and texture are more important from the architect's point of view than from possibly any other member of the building team's, it seems that the practical knowledge to be gained from this section of the course should be most valuable. With most building materials selection has to be made from existing ranges of colour and texture. One of the advantages of concrete would appear to be that, with adequate co-operation between architect and research worker, the range of colour and texture seems to be unlimited.

There is, of course, the question of cost. Certain aggregates are more expensive than others and certain methods of treatment are obviously going to require more labour than others.

To inquiries as to how the promoters of the course could justify the relatively high cost of certain finishes, the answer was that concrete, in this respect, is no different from other materials. The client must be prepared to pay more for a mix using, say, granite chippings (which may cost as much as £1 per ton) and white cement than for gravel at 15s. a yard in the same way as he would be prepared to pay more for a granite facing than for a common brick.

The commercial aspect is, I think rightly, not overstressed on these courses. It is not ignored, however. To the architect the commercial aspect is, or should be, important and the course provides a valuable knowledge of methods and materials which should do much to put designers in the know as to what certain finishes should reasonably cost.

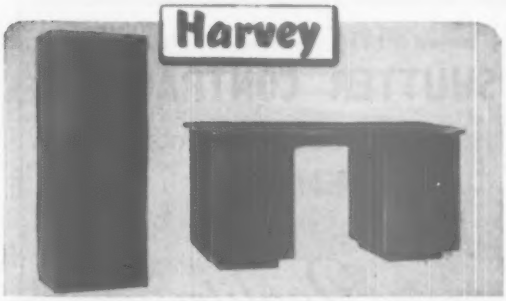
My personal interest in the course was aroused particularly by the work which we were shown on concealment of placing-joints. Apart from the stress laid on the need for accurate placing and proper treatment of first and last loads for each lift, there are various ways of treating the formwork to conceal joints and in this respect the architect has a considerable responsibility in designing the exact positioning of all joints.

By the way, I noted that the selection of a finish from one panel may be rather like choosing a suit length from one pattern. In this connection it is worth noting that work at the experimental station has been done on panels to judge the effect at various distances.

Some of the finishes though ingenious and effective are clearly too tricky for economical commercial practice. But they serve to illustrate that concrete is a material which can be treated in more ways than probably any other building material. In the past the tendency has been to regard it as a useful though not decorative building medium.

This course on surface finishes illustrates the tremendous potentialities of the material as a decorative medium, provided that all the problems are fully understood by all concerned. The course certainly provides a basis for such understanding. Results in practice will depend on the extent to which architects, contractors and manufacturers can co-operate in making use of the accumulated knowledge of the specialists at Stoke Poges.

Harvey



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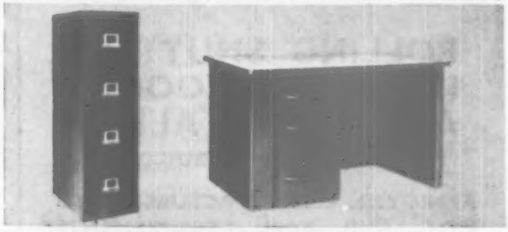

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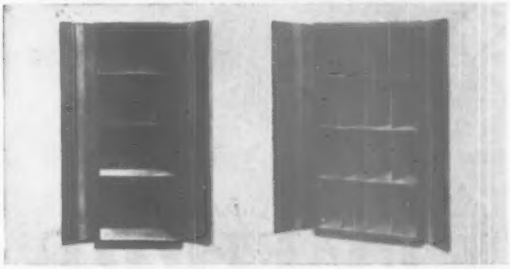

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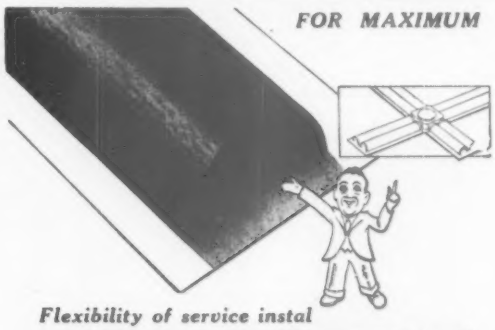

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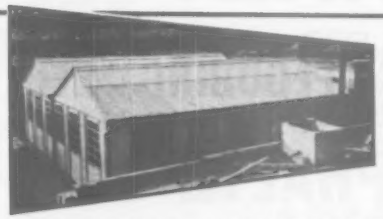

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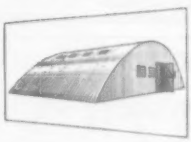

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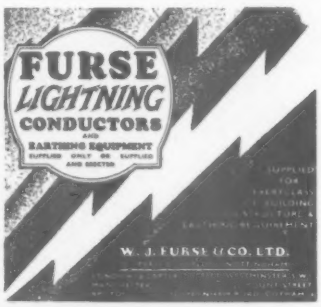

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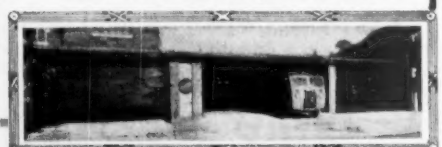

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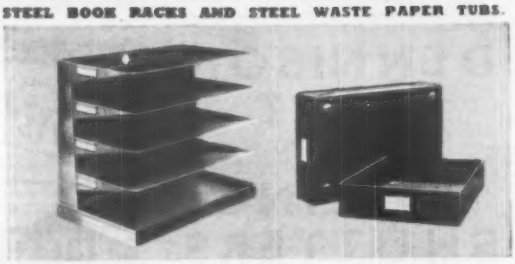

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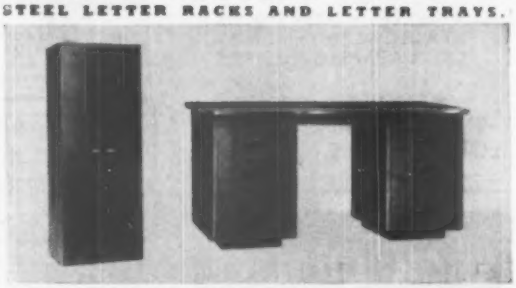

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OFFICIAL ANNOUNCEMENTS

COUNTY BOROUGH OF ST. HELENS.

BOROUGH AND WATER ENGINEER'S DEPARTMENT.

APPLICATIONS are invited for the following appointments on the permanent establishment in accordance with the National Conditions of Service and Salary Scales:—

(a) CHIEF ARCHITECTURAL ASSISTANT, Grade A.P.T. VIII (£685-£780).

(b) ARCHITECTURAL ASSISTANT, Grade A.P.T. VI (£595-£660).

Applicants should be Registered Architects and for appointment (a) Corporate Members of the R.I.B.A., and preference will be given to applicants who have had previous municipal experience.

Housing accommodation will be made available if required by the successful candidate.

The appointment will be terminable by one month's notice on either side and will be subject to the Local Government Superannuation Act, 1937. The successful candidate will be required to pass a medical examination.

Candidates must, when making application, disclose in writing whether to their knowledge they are related to any member of the Council or to a holder of any senior office under the Council.

Applications, stating age, qualifications, present and past appointments, and details of experience, accompanied by copies of three recent testimonials, must be forwarded to the undersigned not later than Monday, 2nd October, 1950.

Canvassing in any form will be deemed a disqualification.

M. WARD, M.I.Mun.E., A.M.T.P.I.,
Borough and Water Engineer.

Town Hall, St. Helens.
24th August, 1950. [4833

CITY AND ROYAL BURGH OF EDINBURGH.

TOWN PLANNING DEPARTMENT ESTABLISHMENT.

APPLICATIONS are invited for the following permanent appointments:—

(a) ONE AREA PLANNING OFFICER (Salary Scale £750-£850).

(b) ONE PLANNING ASSISTANT, A.P.T. Grade V (Salary Scale £520-£570).

(c) ONE MODEL DESIGNER (Salary Scale £520-£610).

Qualifications and experience of candidates should be as below:—

Appointment (a).

Corporate Membership of the Town Planning Institute is essential, together with an additional qualification in Architecture. Duties include examination of planning applications under the Act, preparation of detailed layout plans, street elevations and contributing advice upon architectural developments.

Appointment (b).

Corporate Membership of the Town Planning Institute desirable, together with an additional qualification in Architecture, Engineering or Surveying. Intermediate Examination certificate of a recognised school essential, and Final Examination standard desirable. Experience in a town planning office desirable, but not essential. Duties include preparation of detailed layout plans, site inspection, etc.

Appointment (c).

The successful applicant will be responsible for the construction of Architectural and Town Planning Models for general and detailed development schemes.

Successful applicants will be required to pass a medical examination and will be subject to the Corporation's Superannuation Scheme.

Applications, stating age, present and previous appointments and present salary, qualifications and experience, should be forwarded to the Town Planning Officer, City Chambers, Edinburgh, 1, not later than Monday, 9th October, 1950.

J. STORRAR, Town Clerk.

City Chambers, Edinburgh.
16th September, 1950. [4834

ESSEX COUNTY COUNCIL.

COUNTY PLANNING DEPARTMENT.

THE Essex County Council invite applications for the following appointments on the established staff of the County Planning Department:—

(a) 3 SENIOR PLANNING ASSISTANTS, at a salary not exceeding the maximum for Grade VI, A.P.T.D. (£660 a year) at Wanstead, Colchester and Braintree.

(b) 1 SENIOR PLANNING ASSISTANT (Roads) at a salary not exceeding the maximum for Grade VI, A.P.T.D. (£660 a year) at Broomfield.

(c) 2 PLANNING ASSISTANTS, at a salary not exceeding the maximum for Grade III, A.P.T.D. (£495 a year) at Broomfield and Wanstead.

(d) 1 PLANNING ASSISTANT, at a salary not exceeding the maximum for Grade II, A.P.T.D. (£465 a year) at Broomfield.

(e) 1 DRAUGHTSMAN, at a salary not exceeding the maximum for the General Division (£308 a year females and £385 a year males, at 32 years of age) at Romford.

The salary for post (a) to (d) will be fixed in accordance with the qualifications and experience of the applicant appointed, but will not exceed the maximum salary for the post concerned as stated above.

Candidates for post (a) must be Corporate Members of the Town Planning Institute, and preference will be given to those persons who possess an additional professional qualification to that stipulated. Previous planning experience in a County Planning Department will be an advantage.

Candidates for post (b) must be Corporate Members of either the Town Planning Institute, Royal Institution of Chartered Surveyors, Institution of Civil Engineers or Institution of Municipal Engineers. They must have had previous planning experience, preferably in connection with road proposals for Development Plans and the layout of the road framework of large housing estates, neighbourhood units, etc.

Candidates for post (c) should have had good general experience in a planning office with regard to development control and basic survey and have passed the Intermediate Examination of the Town Planning Institute or some other recognised professional institution.

Candidates for post (d) should have a good knowledge of the Town and Country Planning Act, 1947, and in particular be able to deal with planning applications made under Section 35 of that Act. Consideration will also be given to candidates who, whilst not possessing any previous technical experience, have a sound administrative background in the working of the Town and Country Planning Act, 1947.

Candidates for post (e) should be neat and expeditious draughtsmen and will be required to produce, under supervision, all types of planning maps, tracings from ordnance survey maps, both in pencil and ink, and be expert colourists in water colour and ink.

The appointments will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidates will be required to pass a medical examination to the satisfaction of the Council.

The Scheme of Conditions of Service of the National Joint Council for Local Authorities' Administrative, Professional, Technical and Clerical Services, as from time to time amended, and as adopted by the County Council, is at present applicable to persons appointed on the established staff.

Canvassing, directly or indirectly, will disqualify.

Applications must be made on a form to be obtained from the County Planning Adviser, Broomfield Place, Broomfield, Chelmsford, to whom they should be returned not later than 30th September, 1950.

JOHN E. LIGHTBURN,
Clerk of the County Council. [4821

LONDON COUNTY COUNCIL.

ARCHITECT'S DEPARTMENT.

TOWN PLANNING STAFF.

APPLICATIONS are invited for positions of TECHNICAL ASSISTANT (Scales: (a) £440-£580; (b) 55s.-167s. 6d.) in the Planning Division of the Architect's Department. Candidates should be trained draughtsmen experienced in lettering and in the preparation and colouring of plans.—Application forms from the Architect (AR/EK/P), The County Hall, Westminster Bridge, S.E.1, enclosing stamped addressed foolscap envelope. Canvassing disqualifies. (1193). [4831

Amended Advertisement.

CITY OF BIRMINGHAM EDUCATION COMMITTEE.

APPOINTMENT OF STAFF TO ARCHITECT'S BRANCH.

APPLICATIONS are invited for the following appointments in the Architect's Branch of the Birmingham Education Department (Architect to the Committee: Mr. Alex. Steele, A.R.I.B.A.).

(a) GRADE IX ARCHITECT. Salary A.P.T. IX (£750 x £50 - £900).

The successful candidate should have wide knowledge and experience of the design and erection of prefabricated school buildings. Applicants should be Registered or Chartered Architects having good experience in the control of major contracts.

(b) SENIOR ASSISTANT ARCHITECTS. Salary A.P.T. VIII (£685 x £25 - £760).

Applicants must be Registered or Chartered Architects and must offer evidence of high ability and initiative in design.

(c) SENIOR ASSISTANT ARCHITECT. Salary A.P.T. VII (£635 x £25 - £710).

(d) SENIOR ASSISTANT ARCHITECTS. Salary A.P.T. VI (£595 - £660).

(e) ASSISTANT ARCHITECTS. Salary A.P.T. V (£520 - £570).

Applicants for posts (c), (d) and (e) must be Registered or Chartered Architects and should have had good general experience in the preparation of schemes and working drawings for educational buildings.

(f) ARCHITECTURAL ASSISTANTS. Salary A.P.T. IV (£480 - £525).

Applicants should have reached R.I.B.A. Intermediate standard and should be capable of preparing working details for major contracts.

(g) ARCHITECTURAL ASSISTANTS. Salary A.P.T. III (£450 - £495).

Applicants should have reached the R.I.B.A. Intermediate standard and will be expected to prepare working drawings and details under supervision.

(h) DRAUGHTSMEN. Salary Miscellaneous Grade IV (£360 x £15 - £420).

Applicants should have had good experience as Architectural or Fittings Draughtsmen and will be required to prepare working drawings for major contracts of this type under supervision.

Application forms, which may be obtained from the undersigned on receipt of a stamped, addressed envelope, must be returned not later than 7th October, 1950.

E. L. RUSSELL, Chief Education Officer.
Education Office,
Margaret Street, Birmingham, 3. [4819

SOUTHERN COLLEGE OF ART, PORTSMOUTH.

Principal: W. J. L. Gaydon, A.R.C.A.
Head of School of Architecture:
A. C. Townsend, Dipl.Arch. (L'pool), F.R.I.B.A.

REQUIRED as soon as possible, a full-time ASSISTANT STUDIO MASTER AND LECTURER in Architectural Design.

Applicants should hold the A.R.I.B.A. and preferably a Degree or Diploma of a Recognised School.

Salary in accordance with the Burnham Scale—£300 - £15 - £555 per annum—with additional allowances for training, qualifications and experience, plus a Special Responsibility allowance of £100 per annum.

Full particulars of the appointment and application form from the Registrar, College of Art, Guildhall Square, Portsmouth.

E. G. BARNARD, M.A.,
Chief Education Officer. [4824

CROWN AGENTS FOR THE COLONIES.

QUANTITY SURVEYOR required by the Government of Kenya for the Public Works Department for one tour of four years in the first instance. Commencing salary according to age and experience in scale £655 rising to £1,140 a year. Outfit allowance £30. Gratuity on satisfactory completion of services. Free passages. Liberal leave on full salary. Candidates, not over 45 years of age, must be Chartered Quantity Surveyors.—Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London, S.W.1, quoting M/N/25532/3A on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. [4826

URBAN DISTRICT OF ELLESMERE PORT.

APPOINTMENT OF TWO SENIOR ARCHITECTURAL ASSISTANTS (HOUSING).

APPLICATIONS are invited from qualified and experienced men for the above appointments on the permanent salaried staff of the Engineer and Surveyor to the Council. Applicants must have had considerable experience in design and construction, particularly in relation to housing. The Council's authorised housing programme provides for the erection of houses at the rate of 400 houses per annum for the next 5-6 years in order to meet the housing needs of extensive and important local industries in course of development on a large scale. The salary to be offered will be within Grade IV or V of the A.P.T. Division of the National Salary Scales (£480 per annum-£525 per annum or £520 per annum-£570 per annum), according to qualifications and experience.

Weekly tenancies of suitable Council houses will be available for successful applicants requiring housing accommodation for their families.

Applications, stating age, qualifications and experience, together with the names and addresses of two persons having knowledge of the applicant's experience and antecedents to whom reference can be made, must reach me by not later than Tuesday, the 3rd October, 1950.

P. J. HODGES, Clerk of the Council.

Council Offices,
Ellesmere Port.
18th September, 1950. [4835

SOUTH-EAST METROPOLITAN REGIONAL HOSPITAL BOARD.

REGIONAL ARCHITECT.

IN the vacancy caused by the resignation of the present incumbent (taking effect on 30th September, 1950) applications are invited for the post of REGIONAL ARCHITECT to the South-East Metropolitan Regional Hospital Board at an annual salary of £1,350 x £50 - £1,550 plus £50 London Weighting Allowance. The post is superannuable under the National Health Service (Superannuation) Regulations, 1947-9, and is terminable by three months' notice on either side. Preference will be given to candidates of proved administrative ability, and the Officer will be responsible for the organisation and administration of the Board's architectural department, and the Board's dealings with Consultants. Hospital experience is desirable. Applications, which should include a brief statement of qualifications and experience, together with the names of three referees, should reach the Secretary to the Board at 11 Portland Place, London, W.1, not later than 3rd October, 1950. [4820

CRAWLEY DEVELOPMENT CORPORATION invites applications for the appointment of DRAUGHTSMAN within the salary Grade V, £400 x £25 - £525 p.a. Contributory superannuation.

Applicants must be capable draughtsmen with good structural knowledge and experience in presentation technique. They must have had experience in an architectural office.

Form of application can be obtained from the Chief Architect, Broadfield, Crawley, Sussex, and should be returned to him not later than the 5th October, 1950.

C. A. C. TURNER, Chief Executive. [4823

BOROUGH OF MITCHAM.

BOROUGH ENGINEER & SURVEYOR'S DEPARTMENT.

APPOINTMENT OF ARCHITECTURAL ASSISTANT.

APPLICATIONS are invited for the above appointment in the Borough Engineer and Surveyor's Department of the Corporation of Mitcham.

The appointment will be within Grades III or IV (A.P.T. Division) of the National Scale of Salaries, namely, between £450 and £495 per annum or between £480 and £525 per annum, dependent upon the qualifications and experience of the candidate, plus London "weighting."

Particulars and the form in which applications are to be submitted, may be obtained from the Borough Engineer and Surveyor, Town Hall, Mitcham, Surrey, to whom applications should be addressed, endorsed "Architectural Assistant." The latest date for the receipt of applications is 14th October, 1950.

R. H. WHITE, Town Clerk.

Town Hall, Mitcham.
12th September, 1956 [4817

BOROUGH OF WORTHING.

ARCHITECTURAL ASSISTANT.

APPLICATIONS are invited for the appointment of an ARCHITECTURAL ASSISTANT on the permanent establishment of the Borough Engineer and Surveyor's Department at a salary in accordance with Grade A.P.T. III, commencing salary £450, rising by annual increments of £15 to £495 per annum.

Applicants should preferably have passed the Intermediate Examination of the Royal Institute of British Architects and should have had a sound experience in the preparation of drawings and specifications for general architectural work, including housing.

The appointment will be subject to the National Scheme of Conditions of Service of Local Government Officers, to the Local Government Superannuation Act, 1937, and to the successful candidate passing satisfactorily a medical examination.

Applications, endorsed "Architectural Assistant," stating age, qualifications, present and past appointments and experience, with dates and accompanied by copies of two recent testimonials, should be forwarded to the Borough Engineer and Surveyor, Town Hall, Worthing, not later than 12 noon on Friday, the 6th October, 1950.

ERNEST G. TOWNSEND, Town Clerk.

Town Hall, Worthing.
12th September, 1950. [4829

CROWN AGENTS FOR THE COLONIES.

ARCHITECTURAL DRAUGHTSMAN (male or female) required by the Government of Tanganyika for the Public Works Department for one tour of two to three years in the first instance. The appointment will be on probation for permanent and pensionable employment. Commencing salary according to qualifications and experience in scale (male) £670 a year rising to £840 a year (female) £536 a year rising to £672 a year. Outfit allowance up to £45. Free passages. Liberal leave on full salary. Candidates, not over 40, must be expert draughtsmen with considerable experience in a large drawing office, preferably architectural, and must be able to prepare finished architectural plans, working drawings and tracings from original designs. They should be fully conversant with normal building and architectural details and have a knowledge of plan registration and print manufacture. Female candidates must be SINGLE.—Apply at once by letter, stating age, full names in block letters and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London, S.W.1, quoting M/N/25364/3A on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. [4827

LONDON COUNTY COUNCIL.

APPLICATIONS are invited for positions of ARCHITECTURAL ASSISTANT (salaries up to £580 a year) in the Housing and Valuation Department. Commencing salaries will be determined according to qualifications and experience. Engagement will be subject to the Local Government Superannuation Acts, and successful candidates will be eligible for consideration for appointment to the permanent staff on the occurrence of vacancies.

Successful candidates will be required to assist in the design, layout and preparation of working drawings for housing schemes (cottages and multi-storey flats) and will be employed in the Housing Architect's Division.

Forms of application may be obtained from the Director of Housing, The County Hall, Westminster Bridge, S.E.1 (stamped addressed envelope required and quote reference A.A.1). Canvassing disqualifies. (816) [0101

LONDON COUNTY COUNCIL.

ARCHITECT'S DEPARTMENT.

CLERK OF WORKS FOR HOUSING DIVISION.

CLERK OF WORKS (salary £550) required immediately for housing work in the Architect's Department. Candidates should have a wide experience in supervising large building works.

Application forms from Architect to the Council (AR/EK/HCW), County Hall, S.E.1, enclosing stamped addressed foolscap envelope. Canvassing disqualifies. (1206). [4830

CROWN AGENTS FOR THE COLONIES.

BUILDING SURVEYOR required by Hong Kong Government Public Works Department for three years with prospect of permanency. Salary, including expatriation pay, payable in local currency equivalent at the present Government rate of exchange to £784 a year rising to £1,365 a year, plus cost of living allowance at present equivalent to between £274 and £637 a year according to salary and dependants. Commencing salary according to qualifications and experience. Free passages. Liberal leave on full salary. Candidates, not over 45 years of age, must be Chartered Surveyors, and have had at least five years' experience in a City Engineer's or similar office dealing with the approval of plans for the construction of buildings including reinforced concrete framed structures.—Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London, S.W.1, quoting M/N/23704/3A on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. [4828

AIR MINISTRY have vacancies for DESIGNERS/DRAUGHTSMEN in the Designs Branch of the Works Department for high class work in the following fields. Architecture, Drainage and Water Supply, Land Survey. The work includes designs for London Airport. Salaries are on ranges up to £750. Starting pay according to age and qualifications.—Applications, stating age, qualifications, previous appointments and salary required should be sent to Air Ministry, S.2(h), Cornwall House, London, S.E.1. It is regretted that applications of candidates not called for interview cannot be acknowledged. [4753

ARCHITECTURAL APPOINTMENTS VACANT

ARCHITECTURAL Assistants with experience in steel framed buildings required to work on large Government office building. Senior and lower graded Assistants will be selected on ability and experience rather than salary required.—Write, stating age, experience and salary, to Louis de Soissons, A.R.A., & Partners, 3 Park Square Mews, London, N.W.1. [4796

JUNIOR Architectural Assistant required, up to R.I.B.A. Intermediate Standard, for London office, capable of executing working drawings, etc.; to start immediately. Interesting work and scope for applicant showing initiative.—Apply in writing, stating age, training, experience and salary required, to Elie Mayorcas, F.R.I.B.A., 13 David Mews, Baker Street, W.1. [4822

REQUIRED at once, competent Junior Architectural Assistant. Good draughtsman working drawings and details. Good salary paid. West Lancashire area. Private practice.—Write with details, Box 6323, The Architect and Building News. [4808

SENIOR Assistants required for Welwyn Garden City Office.—Write, stating age, experience, and salary required, to Louis de Soissons, A.R.A., & Partners, 3 Park Square Mews, N.W.1. [4825

SITUATIONS VACANT

ARCHITECTURAL Metal Workers require a Designer-Draughtsman of considerable merit. Top salaried position for skilled man.—Apply The Morris Singer Company, Hope House, Gt. Peter Street, Westminster, S.W.1. [0095

CHIEF ARCHITECTURAL DRAUGHTSMAN required to take charge of Chief Staff Architect's Drawing Office at Havering, near Romford. Sound knowledge of industrial building construction is essential. Five-day working week and pension scheme are in operation. Staff canteen.—Applications, stating age, experience and salary required, to Chief Staff Architect, Ilford Limited, Romford, Essex. [4785

SITUATIONS WANTED

ARCHITECTURAL Assistant, 25, unqualified, but competent to carry works from preliminary survey to F.S. details and site supervision. Experience with Brewer's Architect. Specialising in Hotels, Restaurants and Licensed Premises. — Box 6458, The Architect and Building News. [4832

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Builders and Contractors desiring to tender should apply to the Borough Engineer and Surveyor, Mr. D. J. Howe, M.I.C.E., M.I.Mun.E., 26-30 King's Road, Brighton, and enclose a deposit of £2 2s. 0d. for each section (made payable to the Brighton Corporation) which will be refunded on receipt of a bona-fide tender or notification of inability to tender, providing such is received before the latest date of tendering.

The Plans may be viewed during the usual office hours.

Sealed tenders, suitably endorsed, are to be delivered in the enclosed envelope provided to the undersigned, not later than 12 noon, Tuesday, the 3rd October, 1950.

The successful tenderer will be required to enter into a Bond with an approved Guarantee Insurance Company or Bank for the due and proper completion of the work.

The Council do not bind themselves to accept the lowest or any tender.

J. G. DREW, Town Clerk.

Town Hall, Brighton.
5th September, 1950. [4818

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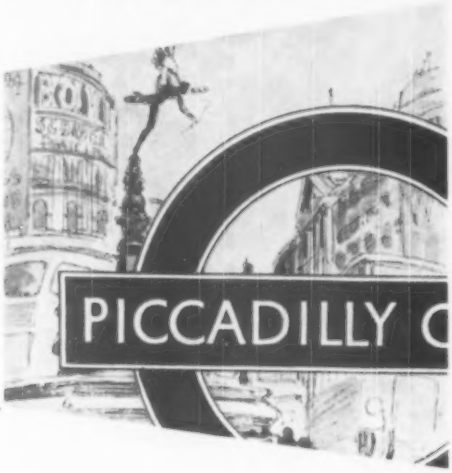

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